4.6 MARINE BIOLOGICAL RESOURCES

This section describes the marine resources in the Project area and the potential impacts the proposed Project could have on those resources. The Environmental Setting section describes the marine resources in the Southern California Bight (SCB) because a large oil spill could have wide-ranging environmental effects throughout Southern California waters, and not just in the Santa Barbara Channel. The section also describes the specific marine resources found in the immediate Project area because those resources would be the most vulnerable to impacts from the proposed Project. The Environmental Setting section is based primarily on existing literature, but has been augmented with the authors' personal experience in the Project area. The impact section identifies potential impacts to marine resources from caisson repair on Pier 421-2 and identifies mitigation for potentially significant impacts. Operational impacts would be limited to accidents including an oil spill or a collision between an oil-carrying vessel and a marine mammal. Mitigation measures are identified to reduce the potential effects of these accidents. The MMs for a collision between a marine mammal and a vessel are consistent with those developed as part of the EMT EIR (CSLC 2006) because vessels would be operating to and from the EMT.

This document incorporates by reference the conclusions of the EMT EIR regarding marine biological resources and summarizes these conclusions where appropriate. Where this document relies upon MMs contained in the Draft EMT EIR to address Project impacts, these are summarized to permit report reviewers to understand their relationship to the Project. This document also incorporates data from Santa Barbara County 01-ND-34 and city of Goleta 06-MND-01.

4.6.1 Environmental Setting

PRC 421 is located on the Ellwood coast in the Santa Barbara Channel, which occupies the northwest corner of the SCB. The sea floor in the Santa Barbara Channel consists of a complex topography of ridges, islands, and basins. The complicated physiography of the region has created a diverse collection of marine environments. The bathymetric features greatly influence such factors as current flow and sediment transport throughout the SCB and these processes in turn have profound effects on the biological communities (Chambers Group 1987, Dailey et al 1993). In Southern California, upwelling occurs along both mainland and island shores as northwest winds displace coastline surface water that is then replaced by nutrient rich deeper water. Upwelling is most intense in April, May, and June and is one of the factors that accounts for the high productivity and diversity of the SCB marine life.

The Santa Barbara Channel region is bordered on its seaward margin by the northern Channel Islands consisting of Anacapa, Santa Cruz, Santa Rosa, and San Miguel. These islands support unique and important marine communities and also shelter the mainland coast from the direct force of the incoming south swell. Point Conception shelters the Channel from northwest swells. The Channel thus provides a relatively protected and benign environment for marine organisms. The Channel lies along important migration routes for marine mammals, fishes and seabirds and also contains a rich, diverse assemblage of resident marine life. These abundant marine resources support a number of important commercial fisheries, aquaculture, and kelp harvesting.

Marine habitats within the Channel include mud, sand, and rocky bottoms, as well as scattered offshore reefs and extensive kelp forests along the coastal and island margins. Sandy and rocky beaches as well as mud-bottom marshes and estuaries line the coast.

The Ellwood Coast region extends for approximately 2 miles west from Coal Oil Point to the Bacara Resort. This section of coast is characterized by a broad sweep of south-facing sandy beach, broken in several places by rocky intertidal habitat and the mouths of one major and two minor estuaries. Within this reach, rocky intertidal habitat is concentrated at Coal Oil Point and within the bay approximately 1 mile west of Coal Oil Point, opposite the western areas of the Ellwood Open Space (Figure 4.6-1). Sandy beaches tend to aggregate in areas surrounding the estuary mouths and can be ephemeral and replaced by shale or sandstone shingle in areas away from sand sources during the winter months. The mouth of the area's major estuary, the Devereux Slough, lies approximately 0.25 miles west of Coal Oil Point. Seasonal freshwater discharge and sand deposition from this slough provides substantial input to the marine environment, including supporting a wide sandy beach backed by an extensive dune system west of the slough mouth. Toward the western border of the Ellwood Coast, the estuaries of two perennial coastal streams, Bell and Tecolote Canyon creeks, contribute both sand and seasonal freshwater input into this coastal ecosystem.

The offshore regions of the Ellwood Coast are characterized by a gently sloping seafloor that averages 36 feet in depth approximately 1 mile from the shoreline. These offshore areas include a mix of low rocky reef and sand bottom substrate. Both the eastern reaches of this area west of Coal Oil Point and the western areas off of Bell and Tecolote Canyon creeks appear to be dominated by sandy substrate, becoming increasingly rocky toward the central area of the Ellwood Coast, including areas offshore from the Project site (Figure 4.6-2; Chambers Group 1987; Santa Barbara

FIGURE 4.6-1. SENSITIVE BIOLOGICAL AND MARINE RESOURCE AREAS IN REGION OF THE PROPOSED PROJECT

FIGURE 4.6-2. MARINE HABITATS IN THE VICINITY OF THE PROPOSED PROJECT

County 1991). Kelp beds are scattered throughout both sandy and rocky substrate areas offshore of the Ellwood Coast, but tend to be concentrated and most persistent in areas of rocky substrate. The immediate Project vicinity supports the Ellwood Coast's largest kelp bed. This kelp bed encompasses over 50 acres and begins approximately 500 feet offshore of the existing caissons and extends for over one mile east southeast along the Ellwood Coast before terminating in areas apparently dominated by sandy bottom substrate east of the Sandpiper Golf Course (Figure 4.6-2).

Marine Biological Resources

Plankton

The term plankton refers to organisms that drift with the current. Plankton includes phytoplankton (drifting primary producers, such as diatoms and dinoflagellates) and zooplankton (slightly mobile animals, such as small crustaceans, swimming mollusks, jellyfish, and the drifting eggs and larvae of fishes and benthic invertebrates). Planktonic communities are characterized by patchiness or unevenness in distribution, composition, and abundance.

The most comprehensive data for zooplankton in California waters come from the California Cooperative Fisheries Investigation (CalCOFI) program initiated in 1949. This program has shown that zooplankton tend to be extremely variable in space and time. Zooplankton abundance at any given location may vary by as much as an order of magnitude from season to season and year to year. The occurrence of particular zooplankton species or populations along the California coast is largely governed by currents. Long-term averages of the zooplankton standing stock in the SCB show peak zooplankton abundances in the spring and summer months, and lowest abundances during the winter (Kramer and Smith 1972; Dawson and Pieper 1993). Copepods, thalaceans, euphausids, and chaetognaths usually account for most of the biomass in CalCOFI samples. The most abundant fish larvae are northern anchovy (*Engraulis mordax*), Pacific hake (*Merluccius productus*), and rockfish (*Sebastes* spp).

Phytoplankton assemblages are affected by nutrients, light, water temperature, currents and upwelling, and grazing (Hardy 1993). Species assemblages of phytoplankton in the SCB differ spatially and temporally (Hardy 1993). Near the thermocline, for example, an area of elevated chlorophyll concentration often occurs with a vertical species assemblage that is different from that of the surface layer. Onshore-offshore phytoplankton assemblages differ, but temporal changes between stratified and upwelling conditions tend to be more significant than onshore-offshore changes.

A subsurface chlorophyll maximum layer generally is present in the SCB; in general, phytoplankton abundance and primary production are higher near-shore than offshore (Hardy 1993). The biomass of phytoplankton in Southern California has been found to decrease with increasing distance from shore within the first 6 miles offshore. The depth of maximum phytoplankton abundance usually differs between individual species. Large dinoflagellates are often numerous near the surface, while diatoms are more abundant below a water depth of about 65 feet. Primary production generally shows a subsurface maximum in the SCB.

Zooplankton populations in the SCB can be divided into near-shore and offshore populations (Dawson and Pieper 1993). The near-shore region includes those waters shoreward of the continental shelf/slope break or approximately at the 650 feet depth contour. Transects along the shelf in the SCB have shown that the near-shore zooplankton biomass decreases at stations farther from the coast (Dawson and Pieper 1993). However, different taxa had different distributions and some taxa were more abundant farther from shore than inshore.

Zooplankton of the offshore region include many of the same species found near-shore, but also include more oceanic and deeper water species (Dawson and Pieper 1993). Offshore from the edge of the shelf, zooplankton biomass is variable with depth, but generally higher in the region of chlorophyll, with a maximum at 73 to 83 feet. Zooplankton biomass off Southern California declined during the El Niño years of the 1990s but appears to have recovered (Goericke et al. 2005).

Fish eggs and larvae (*ichthyoplankton*) are an important component of the planktonic community. Because of the importance of commercial and recreational fisheries, ichthyoplankton are the most studied component of plankton in the SCB. Northern anchovy is by far the most abundant species of ichthyoplankton in the SCB (Cross and Allen 1993). Other abundant taxa in the SCB ichthyoplankton include rockfish, California smoothtongue (*Leuroglossus stilbius*), Pacific hake, Mexican lampfish (*Triphotorus mexicanus*), and various species of croaker (*scianidae*). Within the SCB, the larvae of jack mackerel, Pacific hake, and mesopelagic fishes (fishes of mid-water depths) are most abundant 6 to 60 miles from the coast (Cross and Allen 1993). California halibut (*Paralichthys californicus*), turbots (*Peluronichthys* spp.), sea basses (*Paralabrax* spp.), and blennies (*Hypsoblennius* spp) have larvae that are most abundant within 6 miles of the coast. The larvae of clinids (*Gibbonsia* spp.), queenfish (*Seriphus politus*), California clingfish (*Gobiesox rhessodon*), gobies, silversides, and diamond turbot (*Hypsopsetta guttulata*) are most abundant within 1.2 miles of the coast.

Northern anchovy, rockfish, and sanddab (*Citharichthys* spp.) larvae are common both onshore and offshore.

Intertidal Habitat

The mainland shoreline of the Santa Barbara Channel is primarily sandy. Approximately 74 percent of the Santa Barbara County coastline consists of sandy beach and approximately 93 percent of the Ventura County coastline is sand (Dugan et al. 2000). Boulder fields are often present under sandy beaches along the Santa Barbara coast and are alternately exposed and covered by shifting sand. Only about 23 percent of the shores of the Channel Islands consist of sand beach.

The beach adjacent to Piers 421-1 and 421-2 is ephemeral and primarily sandy during the summer months but exhibiting patchy sand with large areas of exposed shale shingle shelf during the winter months. Intertidal boulder fields also are present in the Ellwood area and significant tidepool habitat occurs within the bend of "Ellwood Cove" approximately 0.5 miles east of the Project site and off Coal Oil Point further to the southeast. Rocky intertidal habitat, primarily boulders and cobble, also occurs west of the Project area up-coast from the Bacara Resort. Rocky intertidal habitat is designated as environmentally sensitive habitat (ESH) by the city of Goleta GP/CLUP, the Santa Barbara Local Coastal Plan (LCP), and the UCSB Long Range Development Plan.

Sandy beaches in California are inhabited by an abundant invertebrate community that is an important food source for vertebrate predators including shorebirds, seabirds, marine mammals and fishes (Dugan et al. 2000). More than 60 different species of intertidal invertebrates were identified in a survey of 15 beaches in Santa Barbara and Ventura counties (Dugan et al. 2003). Intertidal invertebrates of sandy beaches show a characteristic zonation related to tidal exposure. The composition of the invertebrate community at a given beach as well as the zonation tends to be extremely dynamic due to the highly mobile nature of the sandy substrate and the resources on which these animals depend (Dugan and Hubbard 2006). Most exposed sandy beaches have two to three zones inhabited by distinct groups of mobile animals. These zones generally

correspond to the relatively dry substrate of the upper intertidal zone at and above the drift line, the damp sand of the mid-intertidal zone, and the wet sand of the lower intertidal zone. Sandy beaches on the mainland coasts of Ventura and Santa Barbara counties are generally richer in species than beaches of the Channel Islands.

The lower intertidal zone (swash zone) in Southern California sandy beaches is dominated by the filter feeding mole crab, *Emerita analoga*, which moves up and down the beach with the tides. The polychaete "bloodworm," *Euzonus*, also is common in the mid to lower intertidal. In the upper intertidal, drift kelp is an important source of food for many invertebrates. Common organisms associated with macrophyte wrack include beach hoppers (*Megalorchestia* spp.), kelp flies (*Coleopa vanduzeei*), isopods (*Alloniscus perconvexus* and *Tylos punctata*) and various species of beetles.

The sandy intertidal areas at Ellwood Beach were sampled in 1986 (Chambers Group 1987) and the dominant organisms collected were the sand crabs, *Emerita analoga* and *Blepharipoda occidentalis,* and the polychaete worm *Nephtys californiensis* in the lower intertidal; the isopod *Excirolana linguifrons* and the bloodworm *Euzonus muronata* in the mid-intertidal; and the beach hoppers *Megalorchestia californiana* and *M. corniculata* in the upper intertidal.

Engle (2001) sampled the sandy intertidal organisms at Ellwood just up the coast (west) from the PRC 421 piers in 2001. The upper beach was characterized by large numbers of isopods (*Tylos punctatus)*, beach hoppers, and kelp flies. The mid-intertidal was dominated by the isopod *Excirolana chiltoni* and beach hoppers. Infauna sampled in the lower intertidal included mole crabs (*Emerita analoga*), polychaete worms (*Lumbrinereis zonata* and *Nephtys californiensis)*, Pismo clams (*Tivela stultorum*), and bean clams (*Donax gouldi*).

Rocky intertidal organisms, like those in the sandy intertidal, tend to be distributed in bands or zones related to tidal height. The occurrence of particular species is based on physical and biological factors such as the ability to withstand exposure to air and to survive "sanding-in" as well as competition for limiting resources, especially space (Chambers Group 1987, Thompson et al 1993).

The boulder field at Ellwood has been extensively studied by researchers from the UCSB (Dixon 1978; Fawcett 1978; Sousa 1977; Thompson et al. 1993). This type of habitat is subject to repeated natural disturbance, both through agitation and overturning of the cobbles by wave action and by periodic sand inundation. The structure and composition of the marine community attached to the boulders depends

on the severity of past disturbance and on how long the boulders have been exposed for recolonization by larvae and or regrowth of colonies surviving the last disaster. Early successional stages of the boulder community tend to be characterized by the green algae (*Ulva* spp.) and the barnacles (*Chthamalus* spp.). Perennial red algae of several species typify the next successional stage. If two years or more went by without major disturbance the tops of the boulders became dominated by the red alga *Gigartina caliculata*. The important feature of this system is that for both invertebrate and algal assemblages, diversity was highest at intermediate frequencies of disturbance.

The Ellwood boulder field community underwent a profound change in composition and dynamics after the large storms of 1983 (Thompson et al. 1993). Wave energy was so high that virtually all of the boulders were violently tumbled and all species of algae and invertebrates were driven to low abundances. Early recolonization by *Ulva* and the tube-building polychaete *Phragmatopoma californica*, occurred but later successional stages were slow to re-appear.

Intertidal habitat at Coal Oil Point to the east of PRC 421 consists of flat sandstone shingle with scattered boulders and a high sand influence, especially in the upper zones (Ambrose et al. 1992). Tidepools are extensive along the beach and the area is characterized by tar from oil seeps (Tway 1991). The boulder habitat is dominated by the green algae *Ulva* and *Enteromorpha.* Larger rocks are dominated by the acorn barnacle *Chthamalus* and the anemone *Anthopleura elegantissima.* Clusters of mussels *Mytilus californianus* also occur. Several species of red algae also are present. The rocky intertidal at Coal Oil Point has been designated an ESH area (ESHA) in the Santa Barbara County LCP for its remarkable rich intertidal invertebrate fauna (Santa Barbara County 1982).

Subtidal Habitat

The vast majority of the subtidal benthic habitat on the SCB mainland shelf consists of soft bottom. The soft bottom benthic invertebrates of the Southern California mainland shelf have been studied extensively. The SCB Regional Monitoring Program has been performing recent surveys of the benthic invertebrates of the SCB mainland shelf (Ranasinghe et al. 2003). Sites on the mainland shelf were sampled between 30 and 400 feet water depth for infaunal invertebrates (invertebrates that live within the sediments). Twelve of the 15 most abundant infaunal taxa in the SCB were annelid worms; 11 were various taxa of polychaetes and the twelfth was oligochaetes. The most abundant taxon on the mainland shelf was the spionid polychaete worm (*Spiophanes duplex*), followed by the brittle star (A*mphiodia urtica*), phoronid worms,

and another spionid polychaete (*Prionospio pinnata*). Infaunal assemblages in very shallow water, less than 33 feet deep, are very much influenced by wave surge and tend to be dominated by fast-moving crustaceans and opportunistic polychaetes (Thompson et al. 1993).

Epifaunal communities (invertebrates that live primarily on the surface of the sediments) of the SCB mainland shelf were sampled in 1998 by trawl between depths of 15 and 650 feet as part of the SCB Regional Monitoring Program (Allen et al. 2002). A total of 313 species of epifaunal invertebrates were collected in the survey. Fourteen species occurred at more than 20 percent of the stations on the mainland, with three species occurring in 50 percent or more of the area. These three widely occurring species were white sea urchin (*Lytechinus pictus*), California sand star (*Astropecten verrelli*), and ridgeback shrimp (*Sicyonia ingentis*). The shallow inner shelf, of less than 70 feet depth, had the lowest invertebrate abundance, biomass, and diversity. Invertebrate abundance, biomass, and diversity increased from the inner to the middle shelf, and from the middle shelf to the outer shelf. Characteristic species of the inner shelf included blackspotted bay shrimp (*Crangon nigromaculata),* tuberculate pear crab (*Pyromaia tuberculata*), spiny sand star (*Astropecten armatus*), and yellowleg shrimp (*Farfantepenaeus californiensis*). California sand star, ridgeback rock shrimp, and white sea urchin characterized the middle shelf. Species typical of the outer shelf (deeper than 330 feet [100m]) included orange bigeye octopus (*Octopus californicus*), northern heart urchin (*Brisaster latifrons),* mustache bay shrimp (*Neocrangon zacae*), flagnose bay shrimp (*Neocrangon resima*), and hinged shrimp (*Pantomus affinis*).

In the shallow sandy subtidal habitat at Ellwood, the tube worm *Diopatra ornata* is the dominant epifaunal invertebrate (Chambers Group 1987). Sand dollar beds (*Dendraster excentricus*) occur in 20 to 30 foot water depths. Other characteristic species on the sand bottom between 20 and 50 foot water depths at Ellwood include the Kellett's whelk (*Kelletia kelleti*), the tube dwelling anemone (*Pachycerianthus imbricata*), the elbow crab (*Heterocrypta occidentalis*), the hermit crabs (*Paguristes* spp.), and the cone snail (*Conus californicus*).

An introduced species of eelgrass (*Zostera asiatica*) occurs in about 18 to 40 foot water depth on soft bottom along the southern Santa Barbara mainland coast. Eelgrass is a flowering plant that enhances biological value where it grows. Eelgrass beds provide important habitat for invertebrates as a source of food and attachment, and for marine fishes that seek the shelter of the beds for protection and also forage on invertebrates that colonize the eelgrass blades and sediments in and around eelgrass vegetation.

Small amounts of eelgrass were observed off Ellwood during underwater surveys in 1986 (Chambers Group 1987).

Subtidal hard bottom habitat is limited off the mainland shelf of the SCB, although subtidal rocky habitat is much more common off the Channel Islands. Rocky subtidal habitat has particular biological value because it provides attachment sites for algae including giant kelp (*Macrocystis pyrifera*) and sessile invertebrates and it provides shelter and food for fishes and mobile invertebrates such as spiny lobster (*Panulirus interruptus*).

The coastline in the Project region has typically been characterized by large beds of giant kelp, which comprise a distinct and complicated type of marine community. Kelp offers food, attachment sites and microhabitats for invertebrates and provides food and shelter for fishes. Kelp beds off the Santa Barbara County mainland coast between Jalama and Carpinteria are designated an ESHA area in the Santa Barbara County LCP (Santa Barbara County 1982).

Two kinds of beds of giant kelp historically have occurred off the Santa Barbara coast east of Point Conception: kelp growing on rocks and kelp growing on sand. In most locations off California, kelp holdfasts require solid substrate for secure attachment, especially in wave-exposed conditions. The kelp beds along the Santa Barbara coast southeast of Point Conception lie in well protected areas and the sand-based kelp had unusual holdfasts that were able to penetrate into the soft bottom and persist (North 1994).

In 1982 and 1983, most of the extensive kelp beds near Santa Barbara were destroyed by large waves and poor growing conditions associated with an El Niño event (MBC Applied Environmental Sciences 1992). The rock-based kelp recovered but the sand based kelp never did. By the late 1980s and early 1990s, after a long period of drought years, sand based kelp began to show signs of recovery. Starting in 1993, several years (e.g., 1993, 1995, and 1998) of heavy rainfall and rough seas occurred in Southern California. In addition, 1998 was another El Niño year. The high temperatures and low nutrients associated with the El Niño conditions are stressful for giant kelp. Most of the sand-based kelp that had started to return to the southern Santa Barbara shoreline disappeared between 1993 and 1998. In the years since the most recent El Niño (1998), sand-based kelp has returned sporadically to the mainland coast of the Santa Barbara Channel. However, the only persistent kelp beds have been those associated with hard substrate.

Some rocky subtidal habitat supporting giant kelp occurs in the eastern portion of the Ellwood area offshore from Pier 421-2 (Chambers Group 1987). The rocky subtidal habitat off Ellwood consists of low rocky reef in 25 to 35 foot water depth. Dominant invertebrates in this habitat include pholad clams, the tunicate *Styela montereyensis*, the urchins *Strongylocentrotus franciscanus, S. Purpuratus*, and *Lytechinus anamesus* as well as the hydroid *Aglaopenia struthionides*. Giant kelp is common on these low reefs. Other kelp species in this habitat include *Egregia menzisii* and *Cystoseira osmundacea*.

Significant subtidal rocky habitat supporting a large kelp forest occurs offshore of the Isla Vista area between Coal Oil Point and Goleta Point east of PRC 421. Common invertebrates in this area include Kellet's whelk, wavy top shell (*Astraea undosa*), sea urchins (*S; strongylocentrotus* and *S. purpuratus*), tunicates (*Styela montereyens),* sea stars (*Pisaster giganteus* and *P. brevispinus*) and giant keyhole limpets (*Megathura crenulata*) (N. Davis, personal observations). In addition to giant kelp, the brown alga *Pterygophora californica* is common in the Isla Vista kelp bed.

Naples Reef, located approximately, 2 miles to the northwest of PRC 421 is a significant rocky reef and kelp area. Naples Reef is designated as an ESHA in the Santa Barbara County LCP (Santa Barbara County 1982). Naples Reef supports a great diversity of invertebrates and algae. The reef is about 1 acre in size and averages 26 to 40 foot depth (Chambers Group 1987). Naples Reef is an important fishing and SCUBA diving area and has been used as a research site by UCSB marine biologists for decades.

Fishes

Common water column fishes in the upper water column and near-shore waters of the SCB include northern anchovy and Pacific mackerel (*Scomber japonicus*) and predatory schooling fishes, such as Pacific bonito (*Sarda chilensis*) and yellowtail (*Seriola lalandi*); and by large solitary predators, like blue sharks (*Prionice glauca*) and swordfish (*Xiphias gladius*) (Cross and Allen 1993). Northern anchovy is the most abundant epipelagic fish in the SCB (Aspen 2005). The largest schools occur within 25 miles of the coast over deepwater, particularly escarpments and submarine canyons. During daylight hours in summer and fall, large compact anchovy schools may be found at depths of 360 to 600 feet. These schools rise to the surface at night and disperse. In spring, many small schools are found at the surface during the day, and the fish scatter over a wide area at night. Most fishes of the epipelagic zone are widely distributed in the SCB.

Common water column species of near-shore soft bottoms include jacksmelt (*Atherinopsis californiensis*), topsmelt (*Atherinops affinis*), California grunion (*Leuresthes tenuis*), queenfish (*Seriphus politus*), walleye surfperch (*Hyoerprosopon argenteum*), white seaperch (*Phanerodon furcatus)*, northern anchovy, and white croaker (*Genyonemus lineatus*), a bottom feeder that lives in the water column (Cross and Allen 1993; Chambers Group 1994). A number of other water column species including Pacific bonito (*Sarda chilensis*), jackmackerel (*Trachurus symmetricus)*, and brown smoothhound (*Mustelus henlei*) also sometimes occur in near-shore waters. Most of the water column species found in California near-shore waters are widely distributed from bays and estuaries out to ocean depths of 100 feet or more (Love 1996).

Demersal fishes of the SCB soft bottom habitats have been sampled extensively by trawling (Cross and Allen 1993). The SCB Regional Monitoring Program recently collected trawl samples of demersal fishes throughout the SCB shelf at water depths between 15 and 650 feet (Allen et al. 2002). A total of 143 species of fish were collected in the survey. The most abundant species were white croaker, Pacific sanddab (*Citharichthys sordidus*), California lizardfish (*Synodus lucioceps*), and queenfish. By depth, the lowest values of fish abundance, biomass, and species richness were found on the inner shelf at depths shallower than 100 feet. The middle shelf of depths of 100 to 400 feet had the highest number of species.

Characteristic species of the inner shelf include California halibut (*Paralichthys californicus*), barred sand bass (*Paralabrax nebulifer*), speckled sanddab (*Citharichthys stigmaeus*), and white croaker (Allen et al. 2002). Species typical of the middle shelf include yellowchin sculpin (*Icelinus quadriseriatus*), hornyhead turbot (*Pleuronichthys verticalis),* bigmouth sole *(Hippoglossina stomata*), longfin sanddab (*Citharichthys xanthostigma*), California lizardfish, longspine combfish (*Zaniolepis latipinnis)*, pink seaperch (*Zalembius rosaceus*), plainfin midshipman (*Porichthys notatus*), and California tonguefish (*Symphurus atricaudus*). Finally, abundant species of the outer shelf, at water depths of 430 feet or greater, included Dover sole (*Microstomus pacificus*), Pacific sanddab, slender sole (*Lyopsetta exilis*), and shortspine combfish (*Zaniolepis frenata*).

The most abundant fish observed in soft bottom habitat during underwater surveys off Ellwood was the speckled sanddab (Chambers Group 1987). Other fish species observed in the sandy subtidal off Ellwood included thornback ray (*Platyrhinoides*

triseriata), California halibut, lizardfish (*Synodus lucioceps*), pipefish (*Syngnathus* sp.), diamond turbot (*Hypsopsetta guttulata*), and round stingray (*Urolophus halleri*).

Many fish species are associated with rocky habitat. Fishes congregate around rocky features. Fish abundance on reefs is related to the presence or absence of kelp (*Macrocystis pyrifera*) and substrate relief, although bottom relief greater than 3 feet has been found to have little effect on fish species diversity and abundance (Cross and Allen 1993).

Common fish species of shallow reefs in the SCB include garibaldi (*Hypsypops rubiunda*), blacksmith (*Chromis punctipinnis*), bass (*Paralabrax* spp), halfmoon (*Medialuna californiensis*), sheephead (*Semicossyphus pulcher*), opaleye (*Girella nigricans*), painted greenling (*Oxylebius pictus*), rock wrasse (*Halichoeres semicinctus*), seniorita (*Oxyjulis californica*), and various species of surf perches (Family Embiotocidae) and rockfish (Cross and Allen 1993). Deep reefs are dominated by rockfish.

Depletion of rocky substrate fishes by over fishing has recently become of considerable concern. Species considered over fished include widow rockfish (S*ebastes entomelas*), canary rockfish (*Sebastes pinniger*), yelloweye rockfish (*Sebastes ruberrimus*), darkblotched rockfish (*Sebastes crameri*), bocaccio (*Sebastes paucispinus*), Pacific ocean perch (*Sebastes alutus*), lingcod (*Ophiodon elongates*), and cowcod (*Sebastes levis*). To protect these species, Cowcod Conservation Areas have been established.

The most frequently observed fish species in rocky areas during underwater surveys off Ellwood was the kelp bass (*Paralabrax clathratus*) (Chambers Group 1987). Other common fish species associated with shallow water hard substrate at Ellwood included blacksmith, sheephead, seniorita, pile perch (*Dmalichthys vacca*), black perch (*Embiotica jacksoni*), sand bass (*Paralabrax nebulifer*), lingcod (*Ophiodon elongatus*), cabezon (*Scorpaenichthys mrmoratus*), sarcastic fringehead (*Neoclinus blanchardii*), and several species of rockfish (*Sebastes atrovirens, S. caurinus, S. chrysomelas,* and *S. rastrelliger*).

Fish species killed during detonations to remove an abandoned pier from PRC 421 in October 2005 were identified and counted (Howarth 2006). The most abundant fish species affected by explosives on PRC 421 were topsmelt and Pacific sardine (*Sardinops sagax caeruleus*). Other species collected included jack mackerel, black surfperch, rainbow surfperch (*Hypsurus caryi*), shiner surfperch (*Cymatogaster aggregate*), white surfperch (*Phanerodon furcatus*), kelp surfperch (*Brachyistius*

frenatus), striped surfperch (*Embiotica lateralis*), rubberlip surfperch (*Rhacochilus toxotes*), halfmoon, sheephead, giant kelpfish (*Heterostichus rostratus*), pink surfperch (*Zalembius rosaceus),* and several rockfishes (*Sebastes chrysomelas, S. rastrelliger, S. atroviresn, S. serranoides,* and *S. paucispinis*).

Sandy intertidal habitat in Southern California is used for spawning by a near-shore fish, the California grunion, which lays its eggs in the high intertidal zone between March and August. During the grunion spawning season, eggs and developing embryos are buried in the sand to incubate between the highest tides of each month, at the full and new moon. Beaches in the Project area are used by grunion (City of Goleta 2006).

Seabirds

The continental shelf in the SCB is biologically productive and supports a wide variety of seabirds, many in high densities (Mills et al. 2005). Their distribution and abundance is subject to temporal fluctuations, both seasonally and from year to year, as prey population densities fluctuate. Seabirds are wide-ranging and many of the seabirds that occur in the SCB, including the Project area, migrate seasonally through the area. Other species are resident to the area. Many species roost and nest on the Channel Islands. Seabirds forage widely. Those roosting and nesting on the Channel Islands forage in offshore waters and around the islands, but many species including Brown Pelicans (*Pelecanus occidentali californicus)* and cormorants *(Phalcrocorax* spp.) often fly from the islands each day to forage in near-shore waters. Seabirds, sea ducks (scoters), loons (*Gavia* spp.), and western grebes (*Aechmorphus occidentalis*) constitute most of the avifauna that use the SCB (Baird 1993). Seabird densities tend to be greatest near the northern Channel Islands (i.e., San Miguel, Santa Rosa, Santa Cruz, and Anacapa) in winter and north of Point Conception in spring. Seabird densities are higher along island and mainland coastlines as compared to the open ocean (Mills et al. 2005).

Seabirds tend to congregate at the shelf/slope break, where water depth increases rapidly from about 330 to 6,500 feet. The shelf break/slope fronts and convergences are important habitats for seabirds due to physical processes that promote productivity and concentrate prey (Mills et al. 2005). The diversity of seabirds in the SCB is lowest from May to August and highest from fall to early spring (Baird 1993).

The Channel is noted for its rich marine avifauna (Chambers Group 1992). A variety of marine birds including pelicans, gulls, terns, sea ducks, cormorants, grebes and true sea birds occur in the near-shore waters off the Santa Barbara coast and would be

expected in the Ellwood area. Large numbers of seabirds pass through the area during this migration on their way to northern breeding grounds. Lehman recorded spring seabird migration at Goleta Point, approximately 3 miles east of PRC 421 (Lehman 1978). The most abundant species observed were Arctic loon (*Gavia arctica*), surf scoter (*Melanitta perspicillta*), brant (*Branta bernicia*), Brandt's cormorant (*Phalacrocorax pencillatus*), Bonaparte's gull (*Larus philadelphia*) and Forster's tern (*Sterna forsteri*).

The Channel Islands, especially the northern islands, are extremely important breeding areas for seabirds. These islands support 12 breeding species, including the State's entire population of Brown Pelicans, Xantus's murrelets (*Synthliboramphus hypoleucus scrippsi*), and black storm-petrels (*Oceanodroma melania*) (Mills et al. 2005). The greatest number of species and individual breeding seabirds occur on San Miguel Island (Mills et al. 2005). The State and Federal endangered California Brown Pelican breeds on Anacapa and Santa Barbara Islands.

In the fall of 2005, the offshore portion of pier 421-1, which had become separated from the mainland pier and remained under ARCO's ownership, was removed. This pier, which became known as "Bird Island," supported large numbers of roosting Brown Pelicans and cormorants (*Phalacrocorax* spp.) and also supported nesting by Brandt's cormorants. In addition to Brown Pelicans and cormorants, other marine birds that were observed to use the old pier included snowy egret (*Egretta thula*), little blue heron (*E. caerulea*), Heermann's gull (*Larus heermanni*), California gull (*L. californicus*), and western gull (*L. occidentalis*) (Compton 2006). The pier was located about 850 feet offshore in 32 feet of water and consisted of a wooden deck with steel supports.

To compensate for the loss of bird habitat from removal of the pier, a new structure was installed. Each of the new structures consists of a large column supporting three triangularly shaped platforms projecting out from the column at different directions and at slightly different heights (Compton 2006). Below these three platforms is a circular ledge extending all the way around the column. The structures are arranged in a line extending southwest to northeast in the same general area as the abandoned pier. Birds observed on the new structures following construction included Brown Pelican, Brandt's cormorant, double-crested cormorant (*P. auritus*), snowy egret, Heermann's gull, and western gull.

The waters off Ellwood were monitored for marine mammals during the removal of the old pier on PRC 421. The monitors also recorded observations on seabirds. Seabirds

observed in Project area waters included California Brown Pelican, Brandt's cormorant, double-crested cormorant, Arctic loon, brant, western gull, Heermann's gull, California gull, horned grebe (*Podiceps auritus*) and great egret (*Casmerodius albus*).

Marine Mammals

The marine mammal fauna of the SCB includes at least 34 species that have been identified from sightings or strandings (Bonnell and Daily 1993). All marine mammals are protected under the Marine Mammal Protection Act of 1972 (MMPA). Marine mammals that may occur in the Project area include mysticetes (baleen whales), odontocetes (toothed whales), pinnipeds (seals and sea lions), and the southern sea otter (*Enhydra lutris nereis*). Six species of cetacean are listed as Federal endangered. Two species of pinniped and the southern sea otter are listed as Federal threatened. Listed marine mammals are discussed in detail in the Sensitive Marine Species section below.

California gray whales (*Eschrichtius robustus*) pass through California during their annual migrations between their summer feeding grounds in Alaska and their breeding and calving grounds in Baja California. They are the most common baleen whale in the Channel. Southbound gray whales usually occur in the SCB between December and mid-February (Bonnell and Daily 1993). The northbound migration occurs between mid-February and May. The migration pathway through the SCB is broad and somewhat diffuse (Bonnell and Daily 1993). Some whales travel close to shore while others follow a more offshore route along the Channel Islands.

The Channel Islands support pinniped rookeries for four species – California sea lions (*Zalophus californianus*), northern fur seals (*Callorhinus ursinus*), northern elephant seals (*Mirounga angustirostris)*, and harbor seals (*Phoca vitulina richardsi*) (Aspen 2005). Two of the Channel Islands, San Miguel and San Nicolas, are the largest pinniped rookeries on the west coast south of Alaska. California sea lions are the most abundant pinniped in the Santa Barbara Channel.

Marine mammals in the Project area were monitored during the demolition of the abandoned pier on PRC 421 in October and November 2005. The most frequently sighted species were harbor seals and California sea lions. Bottlenose dolphins (*Tursiops truncatus*) also were observed frequently. Between 55 and 75 common dolphin (*Delphinus* sp.) were seen about 3 nautical miles from the pier.

Harbor seals haul out about 0.4 mile east of Naples Point, about 2 miles up the coast from the PRC 421 wells. This secluded hauling ground and rookery is used both day and night by as many as 165 harbor seals (Santa Barbara County 1982). The Naples harbor seal rookery is designated an ESHA in the Santa Barbara County LCP (Santa Barbara County 1982).

Sensitive Marine Species

Table 4.6-1 lists sensitive marine species that may occur in the Ellwood area.

White Abalone (*Haliotis sorenseni*) – Federal Endangered: In May 2001, white abalone became the first marine invertebrate to be listed as a Federal endangered species. White abalone is a mollusk that occurs on rocky habitat from Point Conception to Baja California at 80 to 200 feet depths (Hobday and Tegner 2000). White abalone has been recorded in water as shallow as 25 feet in the Santa Barbara Channel (Aspen 2005). White abalone typically are found in open low relief rock or boulder habitat surrounded by sand (Hobday and Tegner 2000). There has been a greater than 99 percent decline in both the abundance and density of white abalone in California since the 1970s (Hobday and Tegner 2000). The abalone fishery contributed to the decline of white abalone by over harvesting and reduced the density to the point where recruitment success has been unlikely. White abalone have a moderate potential to occur in rocky habitat in the Ellwood area.

Southern Steelhead (*Oncorhynchus mykiss)* – Federal Endangered: Steelhead are the ocean-going form of rainbow trout. They spawn in coastal streams, but spend their adult lives in the ocean. The southern Evolutionarily Significant Unit of steelhead extends from the Santa Maria River in San Luis Obispo County to the U.S.-Mexican Border. Steelhead occur at times in many of the coastal streams in Santa Barbara County. Steelhead enter their home streams from November to April to spawn (Aspen 2005). Juveniles usually migrate to sea in spring.

Green Sea Turtle (*Chelonian mydas*) – Federal Threatened: Green sea turtles nest primarily in Mexico and on the Galapagos Islands (Aspen 2005). Off the Pacific coast, sightings have been recorded as far north as British Columbia, although most observations of this species are from northern Baja California and Southern California (Aspen 2005). Green sea turtles once were common in San Diego Bay, but now appear to be limited to a single channel in the southern part of the bay where they are year-round residents (Aspen 2005). Green sea turtles are seen from time to time off the Southern California coast, usually during the summer months.

Table 4.6-1. Listed Marine Species that May Occur in the Ellwood Area

Common Name	*Scientific Name*	Status	Habitat	Notes/Occurrence	Frequency
Invertebrates					
White Abalone	*Haliotis sorenseni*	FE	Open, low relief rock or boulder habitat surrounded by sand at 80 to 200 feet depths (Hobday and Tegner 2000)	Point Conception to Baja California; in water as shallow as 25 feet in the Santa Barbara Channel (Aspen 2005)	Moderate
Fishes					
Southern steelhead	*Oncorhynchus mykiss*	FE (south of Point Conception); CSC	Anadromous; returns to natal streams and rivers to spawn;	Spawns in coastal streams in Santa Barbara County	High
Reptiles					
Loggerhead Sea Turtle	*Caretta caretta*	FT	Open ocean, coastal waters, and beaches	Nest primarily near Japan and Australia (Aspen 2005); occasionally observed off southern CA usually during the summer months	Low
Pacific Ridley Sea Turtle	*Lepidochelys olivacea*	FT	Open ocean, coastal waters, and beaches tropical and warm temperate waters	Nesting beaches are along the coasts of Mexico and Costa Rica (Aspen 2005); infrequent visitors to waters north of Mexico, although stranded turtles have been found as far north as Washington	Low
Leatherback Sea Turtle	*Dermochelys coriacea*	FE	Open ocean, coastal waters, and beaches	Most common sea turtle in United States waters north of Mexico; frequently off CA during the summer and fall over the continental slope (Aspen 2005); eastern pacific migratory corridor occurs along the west coast of the U.S. and Mexico	Low
Birds					
California Brown Pelican	*Pelecanus occidentalis californicus*	FE; SE (nesting colony)	Pelagic; Beach and near-shore waters	Nests on Anacapa and Santa Barbara Islands; day roosts on area beaches and structures in PRC 421	High
California Least Tern	*Sterna antillarum browni*	FE; SE (nesting colony)	Near-shore waters; breeding populations in California are restricted to coastal locations; forage close to their breeding colonies in bays, harbors, and near-shore ocean waters	Least terns successfully produced chicks at Coal Oil Point in 2006 for the first time in 40 years.	High
Marbled murrelet	*Brachyramphus marmoratus*	FT; SE	Forages in near-shore waters	Late summer, fall, and winter visitor to southern CA, including Channel Islands	Moderate
Xantus' murrelet	*Synthliboramphus hypoleucus*	ST	Forages in near-shore waters	Breeds on Santa Barbara, Anacapa, and San Clemente Islands	Moderate

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Table 4.6-1. Listed Marine Species that May Occur in the Ellwood Area (continued)

Common Name	*Scientific Name*	Status	Habitat	Notes/Occurrence	Frequency
Mammals					
Guadalupe Fur Seal	*Arctocephalus townsendi*	FT	Rocky shorelines and caves	Breed primarily on Isla de Guadalupe off the coast of Baja CA, Mexico (Carretta et al. 2004); second rookery was discovered at Isla Benito del Este, Baja CA; individual animals appear regularly at the CA Channel Islands (Aspen 2005)	Low
Stellar Sea Lion	*Eumetopias jubatus*	FT	Rocky and sandy beaches; temperate waters	Southernmost breeding ground is Año Nuevo Island in Central CA (Aspen 2005); uncommon in Southern California (Bonnell and Dailey 1993)	Low
Southern Sea Otter	*Enhydra lutris nereis*	FT	Shallow near-shore waters with rocky or sandy bottoms that support large populations of their benthic invertebrate prey (Aspen 2005)	Population occurs primarily from north of Año Nuevo Island in to Point Conception (USGS 2004); small numbers are observed regularly east of Point Conception	High
Blue Whale	*Balaenoptera borealis*	FE	Cold and temperate waters offshore	Aggregate in the Santa Barbara Channel along the shelf break at about the 650 feet isobath (Aspen 2005); most frequent west of San Miguel Island and along the north sides of San Miguel and Santa Rosa, and the western half of Santa Cruz Island; offshore of the Channel Islands (Larkman and Veit 1998)	Low
Sei Whale	*Balaenoptera borealis*	FE	Temperate and subtropical waters	Wintering grounds to feeding grounds that extend from west of the California Channel Islands as far north as Alaska in the summer (Aspen 2005); rare in California waters	Low
Fin Whale	*Blaenoptera physalus*	FE	Cold and temperate waters offshore	Summer distribution is generally offshore and south of the northern Channel Island chain, particularly over the Santa Rosa-San Nicolas Ridge	Low

Table 4.6-1. Listed Marine Species that May Occur in the Ellwood Area (continued)

Common Name	*Scientific Name*	Status	Habitat	Notes/Occurrence	Frequency
Humpback Whale	*Megaptera novaeangliae*	FE	Migrate along submarine ridges and occasionally enter the coastal waters of the San Pedro and Santa Barbara Channels (Lagomarsino and Price 2001)	Summer through fall along the shelf break off the Channel Islands (Aspen 2005)	Low
Northern Right Whale	*Balaena glacialis*	FE	Temperate waters along the shelf and slope	Since 1955, only five sightings of right whales have been recorded in waters off southern CA (Aspen 2005)	Low
Sperm Whale	*Physeter macrocephalus*	FE	Offshore waters year-round in water depths greater than 3330 feet	Peak abundance from April to mid-June and again from late August through November as they pass by during migration (Aspen 2005)	Low

FE = Federal Endangered
ST = State Threatened
FT = Federal Threatened
SE = State Endangered

Loggerhead Sea Turtle (*Caretta caretta)* – Federal Threatened: Loggerhead sea turtles occur worldwide, but nest primarily near Japan and Australia (Aspen 2005). Loggerhead sea turtles are occasionally observed off Southern California during the summer months. On December 16, 2005, NOAA fisheries issued a final rule to protect loggerhead sea turtles that follow warmer El Niño currents and risk becoming entangled in drift gillnet fishing operations. The regulation prohibits drift gillnet fishing in U.S. waters off Southern California for the months of June, July, and August during an El Niño year that raises sea surface temperatures off Southern California.

Pacific Ridley Sea Turtle (*Lepidochelys olivacea)* – Federal Threatened: This species also sometimes is called the Olive Ridley sea turtle. Ridley sea turtles occur worldwide in tropical and warm temperate waters. In the eastern north Pacific, this species' major nesting beaches are along the coasts of Mexico and Costa Rica (Aspen 2005). These sea turtles are infrequent visitors to waters north of Mexico, although stranded Ridley sea turtles have been found as far north as Washington. A Ridley sea turtle was stranded at Ellwood Beach in 2004 (J. Cordaro, National Marine Fisheries Service [NMFS], pers. com. 2006).

Leatherback Sea Turtle (*Dermochelys coriacea*) – Federal Endangered: Leatherback sea turtles in the eastern Pacific are probably part of the western Mexico, Central America, and northern Peru breeding population (Aspen 2005). Leatherbacks

are the most common sea turtle in U.S. waters north of Mexico. Leatherback sea turtles are sighted relatively frequently off California, particularly during the summer and fall. Most observations of leatherback sea turtles off California have been over the continental slope (Aspen 2005). It has been suggested that an eastern Pacific migratory corridor for leatherback sea turtles occurs along the west coast of the United States and Mexico.

California Brown Pelican (*Pelecanus occidentalis californicus*) – Federal Endangered; State Endangered: The California Brown Pelican ranges from northwestern Mexico to British Columbia. It nests on Anacapa and Santa Barbara Islands in the SCB, off the Pacific coast of Baja California, Mexico, and in the Gulf of California, Mexico. The main breeding colonies are in the Gulf of California and on the Tres Marias Islands off western Mexico. California Brown Pelicans are common in the waters offshore the Southern California mainland coast, especially during the non-breeding season of July through December. They are commonly observed off Ellwood and roost on the platforms in PRC 421. Brown pelicans feed primarily on northern anchovy.

California Least Tern (*Sterna antillarum browni*) – Federal Endangered; State Endangered: The California Least Tern ranges from the San Francisco Bay area southward into South America. They are present in California during their breeding season of mid-April to mid-September. Recently, Least Terns have started nesting at the Coal Oil Point Reserve, just east of Ellwood, and in 2006 produced the first chicks there in 40 years. Least Terns forage close to their breeding colonies in bays, harbors, and near-shore ocean waters. Least Terns forage in the ocean from just beyond the surf line to up to one to 2 miles out to sea (Collins et al. 1979). The majority of Least Tern foraging in the ocean is within 1 mile of shore in water less than 60 feet deep (Atwood and Minsky 1983). Least Terns would be expected to forage in Project area waters during their breeding season.

Xantus' Murrelet (*Synthliboramphus hypoleucus*) – State Threatened: Xantus' murrelets range from Baja California to Oregon and Washington. Xantus' murrelets are common spring and summer residents to the Channel Islands and near-shore islands and offshore mainland waters (Lehman 1994). They nest colonially in only 12 to 15 locations, including Santa Barbara, Anacapa, San Miguel, Santa Catalina, San Clemente, and Santa Cruz Islands. Santa Barbara Island contains the largest breeding concentration of this species in the world (Burkett et al. 2003). An effort to remove black rats from Anacapa Island has re-established nesting by Xantus' murrelets there. This species forages throughout the SCB from these nest sites, particularly in the area

between Santa Barbara and Santa Catalina Islands and the mainland, but densities are low (Mills et al. 2005).

Marbled Murrelet (*Brachyramphus marmoratus*) – Federal Threatened; State Endangered: Marbled murrelets are very rare late summer, fall, and winter visitors to near-shore waters in Southern California, including several of the Channel Islands (Lehman 1994). They breed in old-growth coniferous forests along the north coast of California northward through coastal British Columbia and Alaska. The USFWS designated critical habitat for this species, and a recovery plan is in effect. The breeding range in California is north of Monterey County. Like Xantus' murrelet, this species forages in near-shore waters around the islands, as well as more widely in the SCB, which could bring them to Ellwood, but the species is expected to occur here in very low numbers.

Guadalupe Fur Seal (*Arctocephalus townsendi)* – Federal Threatened: Guadalupe fur seals breed primarily on Isla de Guadalupe off the coast of Baja California, Mexico (Carretta et al. 2004). In 1997, a second rookery was discovered at Isla Benito del Este, Baja California. Individual animals appear regularly at the Channel Islands, and a single pup was born on San Miguel Island in 1997 (Aspen 2005).

Steller Sea Lion (*Eumetopias jubatus*) – Federal Threatened: Steller sea lions occur from the Bering Strait in Alaska to Southern California. Their southernmost breeding ground is Año Nuevo Island in Central California (Aspen 2005). Steller sea lions are uncommon in the SCB (Bonnell and Dailey 1993). A few adult or subadult males are sometimes seen during the summer around the west end of San Miguel Island, but no breeding has occurred in Southern California since 1980. Steller sea lions would be very unlikely to occur in the Project area off Ellwood.

Southern Sea Otter (*Enhydra lutris nereis*) – Federal Threatened: The southern sea otter ranges from north of Año Nuevo Island in to Point Conception (USGS 2004). Although the sea otter population is concentrated in central California, otters are frequently sighted south of Point Conception. In January 1999, more than 150 otters were counted south of Point Conception (Aspen 2005). In the spring 2004 sea otter survey, 8 sea otters were observed southeast of Point Conception and in spring 2006, 93 sea otters were counted east of the Point (USGS 2004, 2006). Sea otters are relatively rare in the vicinity of Ellwood but they would be expected to occur in the Project area. A sea otter was recently sighted off More Mesa (Howarth 2006) and in September of 2006, one was seen in Goleta Bay (N. Davis, personal observation 2006).

Sea otters usually inhabit shallow near-shore waters with rocky or sandy bottoms that support large populations of their benthic invertebrate prey (Aspen 2005). In California, otters generally live in waters less than 60 feet deep and less than 1.2 miles offshore.

Blue Whale (*Balaenoptera borealis*) – Federal Endangered: In the eastern north Pacific, blue whales are found from the Gulf of Alaska south to at least Costa Rica (Aspen 2005). In Southern California, blue whales tend to aggregate in the Santa Barbara Channel along the shelf break at about the 650 feet isobath (Aspen 2005). Blue whale occurrence in Southern California is strongly seasonal. Blue whales tend to be present in California waters in June through October with peak numbers in August through October (Larkman and Veit 1998). They are almost never seen in winter. Blue whale sightings are most frequent west of San Miguel Island and along the north sides of San Miguel, Santa Rosa, and the western half of Santa Cruz Island. All blue whales observed in the SCB during CalCOFI cruises between 1987 and 1995 were offshore of the Channel Islands (Larkman and Veit 1998). The largest aggregations were seen off San Miguel Island and southwest of the south end of San Clemente Island. The most recent stock estimate is 1,480 whales (Carretta et al. 2004).

Sei Whale (*Balaenoptera borealis*) – Federal Endangered: Sei whales migrate northward from wintering grounds in temperate and subtropical waters to feeding grounds that extend from west of the Channel Islands as far north as Alaska in the summer (Aspen 2005). Sei whales are rare in California waters. The population off California is believed to be very low (i.e., tens to several hundred).

Fin Whale (*Blaenoptera physalus*) – Federal Endangered: Fin whales occur year-round off central and Southern California with peak numbers in summer and fall (Aspen 2005). In the SCB, summer distribution is generally offshore and south of the northern Channel Island chain, particularly over the Santa Rosa-San Nicolas Ridge. Current estimates place the fin whale population between California and Washington at about 3,279 animals (Carretta et al. 2004). Fin whales may occasionally occur within the Project area, but they would be expected to be rare.

Humpback Whale (*Megaptera novaeangliae*) – Federal Endangered: Humpback whales occur in California in summer through fall. In the SCB, humpback whales tend to concentrate along the shelf break off the Channel Islands (Aspen 2005). Humpbacks often migrate along submarine ridges and occasionally enter the coastal waters of the San Pedro and Santa Barbara Channels (Lagomarsino and Price 2001). The total humpback whale population in the North Pacific is now believed to number more than

6,000 animals with the most recent estimate for the California/Mexico stock at 681 (Carretta et al. 2004).

Northern Right Whale (*Balaena glacialis)* – Federal Endangered: Since 1955, only five sightings of right whales have been recorded in waters off Southern California (Aspen 2005). All of these sightings were recorded between February and May.

Sperm Whale (*Physeter macrocephalus*) – Federal Endangered: Sperm whales are the largest of the toothed whales. Off California, sperm whales are present in offshore waters year-round, with peak abundance from April to mid-June and again from late August through November as they pass by during migration (Aspen 2005). Sperm whales are a pelagic species and usually are found in water depths greater than 3,300 feet. The most recent abundance estimate for the sperm whale population along the west coast of the U.S. between Washington and California is 1,233 whales (Carretta et al. 2004).

Commercial and Recreational Fishing

Fisheries in the Santa Barbara Channel

A wide variety of finfish and shellfish species are harvested in the Santa Barbara Channel. Commercial and recreational fish harvests are tracked by the CDFG and monthly catch data is reported within rectangular blocks, covering 100 square miles (mile^2) each. A total of 179 different fish taxa were harvested commercially in the 27 fish blocks within the Santa Barbara Channel from 1999 to 2005 (CDFG 2006). From 1999 to 2005, the 199,000-ton harvest was valued at $92.1 million.

A few major taxonomic groups represented the bulk of the commercial catch in the Santa Barbara Channel. In particular, market squid (*Loligo opalescens*) represented almost 70 percent of the biomass and 44 percent of the dollar value of the catch. Urchins (*Stronylocentrotus franciscanus*), California spiny lobster (*Panulirus interruptus*), California halibut (*Paralichthys californicus*), crab (*Cancer* spp.), prawns (*Sicyonia ingentis* and *Pandalus platyceros*), sardines (*Sardinops sagax*), and anchovies (*Engraulis mordax*) made up most of the remaining biomass. Together with the market squid, these groups made up nearly 92 percent of the catch value and 98 percent of the catch biomass within the Channel between 1999 and 2005.

The commercial fishery within the Santa Barbara Channel may fluctuate dramatically during El Niño events, and landings differ substantially among ports. In addition, the catch is not uniformly distributed across the Channel. Instead, it is heavily weighted

toward the Channel Island area (catch blocks 684 through 690 in Figure 4.6-3), which encompass only 12.8 percent of the Santa Barbara Channel area, yet accounted for 50 percent of the value and 44 percent of the total biomass of the commercial fisheries within the Channel between 1999 and 2005. Comparatively, the Project area (catch block 654) accounted for 2 percent of the total value and 0.31 percent of the total biomass caught within the Santa Barbara Channel between 1999 and 2005. The total value for catch landed from block 654 was $1.8M, which consisted primarily of lobster, prawns, urchin, halibut, and sea cucumber.

Recreational Fishing

Recreational fishing in the Santa Barbara Channel is conducted from private or charter vessels, piers, or from the shoreline, e.g., beaches, jetties, breakwaters. Other than fishing logs maintained by the commercial passenger fishing vessel (CPFV) fleet, reliable recreational fish-landing data are not available. Fish landed (numbers of fish) by the CPFV fleet that fished in the Santa Barbara Channel area from 1997 through 2003 are provided in Table 4.6-2. The numbers are conservative estimates of CPFV catch because not all CPFV operators participate in the logbook program (CSLC 2006).

Over half (56.8 percent) of the total CPFV catch in the Santa Barbara Channel occurred near the Channel Islands. The CPFV catch fraction around the islands significantly exceeded the fractional area for all but two major taxa (barred sand bass and mackerel).

Abalone (*Haliotis* sp.) were once common in the rocky coastal habitat of the Santa Barbara Channel, but currently all five major species of abalone in central and Southern California are depleted, a result of cumulative impacts from commercial harvest, increased market demand, sport fishery expansion, depredation by sea otters, pollution of mainland habitat, disease, loss of kelp populations associated with El Niño events, substantial poaching losses, and inadequate wild stock management. The California Fish and Game Commission closed the commercial and recreational abalone fishery in southern and central California under emergency action in May 1997. By legislative action in January 1998, the closure was extended indefinitely (CSLC 2006). The Cultured Abalone, a local abalone mariculture company, operates near Dos Pueblos Canyon.

FIGURE 4.6-3. CALIFORNIA DEPARTMENT OF FISH AND GAME FISH BLOCKS WITHIN THE SANTA BARBARA CHANNEL

Table 4.6-2. Ranking of Fish Recreationally Harvested in the Santa Barbara Channel from 1997 to 2003

Common Name	Scientific Name	SB Channel Total [1]	Island Fraction [2]	Mainland/ Open Fraction
Rockfish	*Sebastes sp.*	724,782	64.3%	35.7%
Kelp Bass	*Paralabrax clathratus*	251,840	40.9%	59.1%
Barred Sand Bass	*Paralabrix nebulifer*	249,997	8.5%	91.5%
Ocean Whitefish	*Caulolatilus princeps*	168,015	84.6%	15.4%
Barracuda	*Sphyraena sp.*	119,611	48.6%	51.4%
Rock Scallop	Crassedoma giganteum	67,804	98.3%	1.3%
Scorpionfish	*Scorpaena guttata*	53,964	70.4%	29.6%
Sheephead	*Semicossyphus pulcher*	30,157	87.2%	12.8%
Halfmoon	*Sebastes chrysomelas*	29,798	87.0%	13.0%
Mackerel	*Trachurus symmetricus* and *Scomber japonicus*	26,157	8.3%	91.7%
Yellowtail	*Seriola lanandi*	24,397	86.1%	13.9%
Lobster	*Palnulirus interruptus*	23,124	99.6%	0.4%
Other Fish		88,911	69.7%	30.3%
Taxa Total		**1,858,557**	**56.8%**	**43.2%**

[1] Total fish count over five years based on CPFV logs.

[2] Fraction of the Santa Barbara Channel fish caught in the seven blocks (684 through 690) that encompass the Channel Islands and cover 12.8 percent of the Channel area.

Source: CSLC 2006.

Kelp Beds and Mariculture

In addition to providing habitat as described above, kelp is harvested commercially within the Santa Barbara Channel for various uses. Algin is extracted from a large proportion of the harvest and used as a thickening, stabilizing, suspending, and gelling agent in a wide variety of food, paper, pharmaceutical, cosmetic, and dental products. Mariculture companies are also increasingly using giant kelp as food for their abalone stock.

Kelp beds along the coast can produce as much as 1,000 tons of kelp per year. Near Santa Barbara is a kelp bed leased by The Cultured Abalone, a local mariculture company. Since 1996, their kelp harvest has increased by approximately 15 percent annually, in response to a growing abalone market. The Cultured Abalone harvested approximately 560 tons of kelp in 1999 (CSLC 2006). Approximately half of their tonnage comes from kelp lease 27, off Isla Vista, while the remainder is taken from kelp beds near Cambria.

4.6.2 Regulatory Setting

Federal Laws and Policies

The Marine Mammal Protection Act (MMPA)

Under the MMPA of 1972, the Secretary of Commerce is responsible for the protection of all cetaceans and pinnipeds (except walruses) and has delegated this authority to NMFS. The Secretary of Interior is responsible for walruses, polar bears, sea otters, manatees, and dugongs, and has delegated this authority to the USFWS.

The Endangered Species Act (ESA)

The ESA of 1973, as amended, establishes protection and conservation of threatened and endangered species and the ecosystem on which they depend. The USFWS and NMFS administer the Act. Section 7 of the Act governs interagency cooperation and consultation to ensure that activities do not jeopardize the existence of threatened or endangered species or result in adverse modification or destruction of their critical habitat.

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)

The purpose of the 1976 MSFCMA was to stop over fishing by foreign fleets and aid in the development of the domestic fishing industry. The U.S. has sole management authority over all living resources within the 200-nautical mile exclusive economic zone of the U.S. The 1996 amendments, termed the Sustainable Fisheries Act (SFA), designate and conserve Essential Fish Habitat (EFH) for species managed under a Fisheries Management Plan to minimize any adverse effects on habitat caused by fishing or non-fishing activities and to identify other actions to encourage the conservation and enhancement of such habitat. EFH is defined as “those waters and substrate necessary for spawning, breeding, feeding, or growth to maturity.”

The Coastal Zone Management Act (CZMA)

The policy preserves, protects, restores, or enhances the resources of the nation’s coastal zone for this and succeeding generations to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and aesthetic values as well as the need for compatible economic development.

Fish and Wildlife Coordination Act of 1958

The Fish and Wildlife Coordination Act requires that whenever a body of water is proposed to be controlled or modified, the lead agency must consult the State and Federal agencies responsible for fish and wildlife management (e.g., USFWS, CDFG, and NOAA). This Act allows for recommendations addressing adverse impacts associated with a proposed Project, and for mitigating or compensating for impacts on fish and wildlife.

Oil Pollution Act of 1990

The OPA of 1990, along with the Oil Pollution Liability and Compensation Act of 1989, provides for cleanup authority, penalties, and liability for oil pollution. The OPA creates the Oil Spill Compensation Fund to pay for removal of and damages caused by oil pollution.

National Invasive Species Act of 1996

This Act calls for the implementation of measures to halt the spread of invasive species. To comply with this act, the USCG proposes voluntary guidelines to control the invasion of aquatic nuisance species via ship ballast water. On July 28, 2004, the USCG published regulations establishing a national mandatory ballast water management program for all vessels equipped with ballast water tanks that enter or operate within U.S. waters. These regulations also require vessels to maintain a ballast water management plan that is specific for that vessel.

State and Local Laws and Policies

California Endangered Species Act

The California Endangered Species Act (CESA) parallels the Federal ESA and is administered by the CDFG. Under the CESA, an "endangered species" is defined as a species of plant, fish, or wildlife that is "in serious danger of becoming extinct throughout all, or a significant portion of its range" and is limited to species or subspecies native to California. The CESA prohibits the "taking" of listed species, including species petitioned for listing (i.e., State candidates), except as otherwise provided in State law. State lead agencies are required to consult with the CDFG to ensure that any action they undertake is not likely to jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of essential habitat.

California Coastal Act of 1976, Public Resources Code section 30000 et seq.

The California Coastal Act (Division 20 of the Public Resources Code, section 30000, et seq.) protects and manages coastal resources. The main goals of the Act are to protect and restore coastal zone resources; assure balanced and orderly utilization of such resources; maximize public access to and along the coast; assure priority for coastal dependent and coastal-related development; and encourage cooperation between State and local agencies toward achieving the Act's objectives.

The California Coastal Act, which is administered by the CCC, also identifies protective measures for near-shore marine resources. For example:

Coastal Act section 30230 states:

> "*Marine resources shall be maintained, enhanced, and where feasible, restored. Special* protection *shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*"

Coastal Act section 30231 states:

> *"The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams."*

Coastal Act section 30232 states:

> *"Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur."*

Coastal Act section 30240 states

> *"Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*
>
> *Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas."*

Oil Spill Prevention and Response Act of 1990

The Oil Spill Prevention and Response Act of 1990 (SB 2040) requires that a State oil spill contingency plan be established with a specific component to include a marine oil spill contingency planning element. Under this Act, the Office of Oil Spill Prevention and Response (OSPR) was created, with the CDFG becoming the lead State agency in spill response. The Act requires that persons causing a spill begin immediate cleanup, follow approved contingency plans, and fully mitigate impacts to wildlife. Under an Interagency Agreement with OSPR, the CCC operates an oil spill program and maintains an oil spill staff. Before and after a spill, CCC staff are involved in review and comment to both State, e.g., OSPR and Federal, e.g., U.S. Coast Guard, agencies on contingency plans and regulations related to marine vessels, marine facilities, and marine vessel routing.

Enactment of the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act of 1990 expanded the CSLC's responsibilities, resulting in creation of the Marine Facilities Division. This Division is responsible for ensuring that all marine terminals and other oil and gas facilities within the CSLC's jurisdiction use the best achievable methods to prevent accidents and resulting oil spills. Management responsibilities extend to activities within three nm seaward of mean low water.

California Ballast Water Management for Control of Nonindigenous Species Act of 1999 (AB 703) and The California Marine Invasive Species Act of 2003

The 1999 Act requires vessels to employ prescribed ballast water management practices to reduce the uptake and release of nonindigenous species into State waters. The bill required that the CSLC take samples of ballast water and sediment and to take other action to assess the compliance of any vessel with the prescribed requirements.

The California Marine Invasive Species Act of 2003, which became effective January 1, 2004, revised and expanded the Ballast Water Management for Control of Nonindigenous Species Act of 1999. The Marine Invasive Species Act specifies mandatory mid-ocean exchange or retention of all ballast water for vessels carrying ballast water into California waters after operating outside the State. For vessels coming from other west coast ports, the Act requires minimization of ballast water discharges in State waters. All vessels are required to complete and submit a ballast water report form upon departure from each port of call in California waters. All vessels operating within the Pacific Coast Region are required to manage ballast water per Title 2, Division 3, Chapter 1, Article 4.6.

California Clean Coast Act (SB 771)

The California Clean Coast Act (SB 771) went into effect January 1, 2006, and has several requirements intended to reduce pollution of California waters from large vessels. The California Clean Coast Act prohibits the operation of shipboard incinerators within 3 miles of the California coast, prohibits the discharge of hazardous wastes, other wastes or oily bilgewater into California waters or a marine sanctuary, prohibits the discharge of graywater and sewage into California waters from vessels with sufficient holding tank capacity, and requires reports of discharges to the California State Water Resources Board and submission of an information report to the CSLC.

Santa Barbara County

The coastal reaches adjacent to PRC 421 fall under the jurisdiction of Santa Barbara County. Consequently, Santa Barbara County is one of the agencies responsible for reviewing Project actions including integration of policies established by the California Coastal Act. Santa Barbara County has prepared a LCP in conformance with the California Coastal Act (Santa Barbara County 1982). The LCP identifies ESHAs that have special policies for their protection. ESHAs in the vicinity of PRC 421 include the rocky intertidal habitat at Coal Oil Point and between Point Conception and Ellwood, harbor seal hauling grounds east of Naples, Naples Reef and kelp beds from Jalama to Carpinteria.

The UCSB Long Range Development Plan

The 1990 UCSB Long Range Development Plan (LRDP) was established to identify the physical development necessary to achieve the Campus' academic goals and provide a land use plan to guide the development of future facilities. The LRDP is also intended to respond to the provisions of the California Coastal Act of 1976, with respect to the

preparation of Long Range Development Plans for Campuses in the Coastal Zone. PRC § 30230 of the LRDP states

> *"Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes."*

Specifically, §30230.1 stipulates that development in Coal Oil Point Reserve will be kept to a minimum. The only structures that may be constructed in the Reserve are facilities that would be used in conjuction with research or would enhance the usefulness of the area as a natural study area.

4.6.3 Significance Criteria

An impact on biological resources would be considered significant if any of the following apply:

- There is a potential for any part of the population of a threatened, endangered, or candidate species to be directly affected or if its habitat is lost or disturbed;
- If a net loss occurs in the functional habitat value of: a sensitive biological habitat, including salt, freshwater, or brackish marsh; marine mammal haul-out or breeding area; eelgrass; river mouth; coastal lagoons or estuaries; seabird rookery; ESHA or Area of Special Biological Significance;
- Permanent change in the community composition or ecosystem relationships among species recognized for scientific, recreational, ecological, or commercial importance;
- Prolonged disturbance to or destruction of habitat (or functional habitat value) of a species recognized as biologically or economically significant in local, State, or Federal policies, statutes, or regulations;
- There is a potential for the movement or migration of fish or wildlife to be impeded; or
- If a substantial loss occurs in the population or habitat of any native fish, wildlife, or vegetation or if there is an overall loss of biological diversity. Substantial is defined as any change that could be detected over natural variability.

An impact to commercial or recreational fishing would be considered significant if the proposed Project would:

- Temporarily reduce any fishery in the vicinity by 10 percent or more during a season, or reduce any fishery by 5 percent or more for more than one season;
- Affect kelp and aquaculture harvest areas by 5 percent or more;
- Result in loss or damage to commercial fishing or kelp harvesting equipment; or
- Harvesting time lost due to harbor closures, impacts on living marine resources and habitat, and equipment or vessel loss, damage, or subsequent replacement.

4.6.4 Impact Analysis and Mitigation

Construction

Noise and disturbance during construction activities on Pier 421-2 have the potential to impact marine resources. Proposed repairs to the caisson at 421-2 would include construction of a new seaward-facing wall in front of the existing concrete wall ; however, proposed safety mitigations may require that all six non-seaward-facing walls on Caissons 421-1 and 421-2 also undergo reinforcements which could include construction of walls similar to that proposed for the seaward facing side of 421-2 . This would include installation of a caisson support floor, installation of soldier piles and pre-cast panels, and pouring of concrete slurry behind the new panels. Both proposed repairs and those required as mitigation would be similar to those made on Pier 421-1 in 2004 (City of Goleta 2006).

Impact MBIO-1: Disturbance to Intertidal Organisms during Caisson Repairs

Excavation and jetting of sand around the piles would disturb and kill intertidal invertebrates and might dislodge grunion eggs (Potentially Significant, Class II).

Impact Discussion

Although most of the work to repair the caisson on Pier 421-2 would be done from the pier, beach access would be required to prepare for the installation of the new wall face on Pier 421-1 and 421-2. An excavator on the beach would scrape sand from between the piles and cut into the bedrock to key the concrete panels in the Monterey shale base. As the bottom panel of each section is being set, a sand jet unit on top of the caisson would clear the sand so that the panel would sit directly on or near the Monterey shale base. The excavation of sand at the base of the caisson would kill intertidal invertebrates living in the sand. The amount of sandy intertidal habitat affected by these construction activities would be small (less than 0.5 acres). Intertidal invertebrate communities are adapted to the seasonal shifting of sand off and on the

beach and repopulate rapidly. Because of the small amount of intertidal habitat that would be affected and the fact that the intertidal invertebrate community would be expected to re-establish within a year, these impacts would be less than significant (Class III).

If caisson repair occurs between March and September, excavation or jetting of sand would potentially expose grunion eggs deposited in the high intertidal zone. Because grunion are declining and the beaches where they spawn are limited, destruction of grunion eggs would result in a loss of the functional value of the beach as grunion spawning habitat. The deposition of grunion eggs on a beach is patchy and even a small area can contain a significant number of grunion eggs (Martin 2006). The destruction of grunion eggs is considered a potentially significant impact (Class II).

Mitigation Measures

MM MBIO-1a. Avoid Caisson Repair during Grunion Spawning Season (March through September). Caisson repair shall be conducted between October 1 and February 28 to avoid any potential harm to grunion eggs.

MM MBIO-1b. Biological Monitoring during Caisson Repairs. If caisson repair is done between March and September, monitor the predicted grunion run before sand is disturbed and avoid disturbing any areas where grunion spawned until the next nighttime spring high tide series. Venoco shall hire a qualified biologist to observe the intertidal area within the construction footprint during predicted grunion runs (the nights of full and new moons and the following three or four nights). If grunion are observed to spawn within the proposed construction area, sand excavation and jetting shall be avoided within the observed spawning area until after the next full or new moon.

Rationale for Mitigation

Avoiding caisson repair activities during the grunion spawning season would ensure that no grunion eggs were killed or damaged by caisson repair activities. If repair must occur between March and September, monitoring grunion spawning and avoiding disturbance to any areas where spawning occurred also would avoid impacts to grunion eggs.

Impact MBIO-2: Impacts to Marine Organisms from Sediment Resuspension in the Near-Shore Zone due to Disturbance of Sediments during Caisson Repairs

Construction activities during caisson repairs would have the potential to resuspend sediments in near-shore waters due to the disturbance of beach

sediments. Resuspension of sediment, particularly contaminated sediments, could have adverse impacts on marine organisms (Potentially Significant, Class II).

Caisson repairs would disturb sediments by excavation, jetting and the removal and placement of structures in the sand. Because the piers are located in the intertidal zone, some of this sediment may become suspended in near-shore waters. Suspended sediment may have a number of adverse effects on marine organisms. Sand can interfere with the appendages of filter feeding invertebrates and clog respiratory appendages of invertebrates. The gills of fishes may become abraded by sediments, but usually fishes move out of the area before they suffer harm. Suspended sediments may increase turbidity and interfere with the foraging activities of visual predators including fishes, marine mammals, and seabirds such as California Brown Pelicans and California Least Terns.

Pier 421-2 is located in the intertidal zone where wave action typically suspends sediment. The proposed repair activities would disturb small amounts of sand sized sediments. These sediments would be expected to settle rapidly and would not create extensive turbidity plumes. Marine macrophytes like surfgrass, eelgrass, and kelp require light and, therefore, can be affected adversely if turbidity reduces light levels for an extended period of time. No surfgrass occurs in the vicinity of Piers 421-1 and 421-2. Some eelgrass and kelp beds are found offshore. Because kelp and eelgrass are adapted to periods of natural turbidity, temporary increases in turbidity during construction would not be expected to have an adverse impact on these habitats. Impacts to marine organisms from suspended sediments would be minimal because of the short duration and limited spatial extent of the impacts and because turbidity would occur in the intertidal and shallow subtidal zones that typically are subjected to sediment resuspension from wave action. Impacts would be less than significant (Class III).

As discussed in Section 4.5, Hydrology, Water Resources, and Water Quality, subsurface soils and soil surrounding the piers may be contaminated. If these sediments are released into the marine environment during construction, contaminants may be at levels that could have an adverse impact on marine organisms, a potentially significant (Class II) impact.

Mitigation Measures

Implement MMs WQ-1a through WQ-1b and MMs HAZ-1c through HAZ-1-d.

Rationale for Mitigation

Removal of contaminated sediments prior to in-water construction activities would prevent the release of existing petroleum hydrocarbons resulting from Project activities. Removal of contaminated sub-soil mobilized during drilling would prevent it reaching the surf-zone. Erection of a silt curtain would reduce the dispersion of contaminated sediments from the soils surrounding the piers into the water column and would prevent resuspended sediments from dispersing beyond the immediate construction area.

Impact MBIO-3: Noise Impacts to Marine Life during Caisson Repairs

Construction activities during caisson repairs have the potential to generate noise from the drilling or pile driving to install new piles and panels. Jetting of sand also can create high noise levels. Construction noise may disturb marine animals, especially marine mammals (Potentially Significant, Class II).

Drilling and pile driving to repair the caisson on Pier 421-2 have the potential to produce loud noises. The noise and activity of construction may alter the behavior of fishes in the immediate vicinity of the pier or cause them to avoid the construction area temporarily. Information on the sound levels to which fishes are sensitive is limited. Fish sensitivity to noise depends on whether they have any sort of auditory mechanisms for improving hearing sensitivity (Southall 2005). Most fishes do not have special auditory mechanisms and are hearing generalists with relatively poor hearing sensitivity over a narrow band of low sound frequencies (about 0.1 to 1.0 kHz). Hearing specialists have unique anatomical features that afford them greater hearing sensitivity over a relatively wider range of low sound frequencies (about 0.1 to 3.0 kHz). Hastings et al (1996) exposed fish (*Astronotus ocellatus*, the oscar) in the laboratory to sounds in order to determine the effects of sound at various levels typical of man-made sources on the sensory epithelia of the ear and the lateral line. Sounds varied in frequency (60 to 300 Hz), duty cycle (20 percent or continuous) and intensity (100, 140, or 180 dB//1uPa). The only damage that was observed was in four of five fish stimulated with 300-Hz continuous tones at 180 dB//1uPa and allowed to survive for four days. Damage was limited to small regions of the ear. These data suggest that for at least some types of fish only limited physical damage will occur even at exposure to very high levels.

Ford and Platter Rieger (1986) studied the reaction of schooling fishes to pile driving. Pile driving had no apparent effect on the behavior of topsmelt. However, northern anchovy exposed to pile driving sounds at close range altered their behavior and

seemed agitated. There was a consistent tendency for anchovy to move away from the main pile driving sound source. Because construction activity would be of short duration, because most fishes appear to have low sensitivity to noise, and because a small number of individual fishes, if any, would be affected, impacts to fishes would be expected to be less than significant (Class III).

Loud noises may disturb California Brown Pelicans and cormorants roosting on the structures offshore from Pier 421-2. Varanus Biological Services monitored the behavior of Brown Pelicans roosting on the breakwater during dredging of the Marina del Rey entrance channel (Varanus 1999). Punctuated events including dredge start-up after periods of inactivity and the tugboat passing between the dredge and the breakwater to retrieve the haul barge caused disturbance to the colony including movements of occasionally large numbers of birds. However, these impacts were generally of short duration (a few minutes) and resulted in pelicans shifting positions along the breakwater. Unusual, sudden or infrequent events of a dramatic nature (fireworks, spotlighting the colony by a boat closely approaching the breakwater, illuminating the breakwater by the dredge after long periods of inactivity) displaced roosting pelicans from the breakwater for lengthy periods of time. The largest reaction to disturbance observed during the monitoring was to an earthquake. All the pelicans left the breakwater in reaction to the event and did not return for 45 minutes. Noise from pile driving is typically between 81 and 96 decibels on the A-weighted scale (dBA) at 50 feet. The Bird Island structures are located over 800 feet offshore. Noise associated with pile driving activities would be expected to attenuate to the 60 to 65 dBA range by this distance and it is unlikely the noise would disturb the roosting birds on the structure. However, disturbance to the roosting habitat of the endangered California Brown Pelican, if it did occur, would be a potentially significant impact (Class II).

Noise associated with drilling and pile driving may be of a level to disturb marine mammals. Baleen whales are thought to be most sensitive to low frequency sounds (about 0.01 kHz to 5 kHz) based on characteristics of their auditory morphology and sound production (Southall 2005). Most odontocete cetaceans that have been directly tested have relatively good hearing sensitivity across a broader range of mid to high frequencies (about 4 kHz to 100 kHz). Sea lions and fur seals have been shown to be sensitive to a fairly wide range of mid frequencies (about 1 kHz to 30 kHz). True seals are generally capable of hearing across a wide range of low to mid sound frequencies (about 0.2 kHz to 50 kHz). The dominant components of the "communication" calls of most marine mammals fall within the 20 Hz to 20 kHz range (CSLC 2006).

NOAA Fisheries has adopted 160 decibels (dB) as an acceptable level of impulsive underwater sound. Based on available scientific evidence, acoustic harassment of marine mammals would not be expected to occur below this conservative level. Noise from drilling may exceed 160 dB. Drilling rigs may produce noise up to 174 dB (CSLC 2006). Diesel-powered pile drivers also may produce loud noises. Therefore, caisson repair operations have the potential to produce noises at a level high enough to have adverse impacts to marine mammals. Observations of the reaction of baleen whales to offshore oil drilling operations have suggested that the radius of response is within 333 feet (100m) (Aspen 2005).

Acoustic monitoring was done during explosive detonations to remove the abandoned Bird Island pier and during pile driving operations to install the new Bird Island platforms (Howarth 2006). Both a conventional pile driver and a vibratory pile driver were used at different times during construction. The conventional pile driver emitted sounds as high as 178 dB. The vibratory pile driver was generally quieter with a sound of 147 dB at a distance of 1,350 feet although sounds as high as 179 dB were recorded. No mortality of any wildlife was noted following any pile driving operations. The monitors concluded that neither the explosive detonations nor the pile driving had any significant effects on marine mammals. However, the monitoring was only able to address observable behavioral responses. The study did not address potential long-term effects.

Marine mammal monitors were present during caisson repair on Pier 421-1 (City of Goleta 2006). A 500-foot safety zone was established for marine mammals and a vibrating pile driver was used. During pile driving activities, monitors neither observed any marine mammals within the 500-foot safety zone nor did they observe changes in the movement or behavior of more distant individuals that would indicate any reaction to pile driving noise.

Although no adverse impacts to marine mammals were noted during previous pile driving operations at PRC, 421, pile driving and drilling have the potential to exceed the 160 dB limit established as the limit to avoid acoustic harassment of marine mammals. Harassment of marine mammals by noise is a potentially significant impact (Class II).

Mitigation Measures

In addition to MMs NZ-1a through NZ-1c, the following mitigations shall be applied to the proposed Project.

MM MBIO-3a. Marine Mammal Monitors. Venoco shall have qualified marine mammal monitors present during all construction. A 1,500 foot safety radius shall be established on the seaward side of the pier to serve as a protection zone for marine mammals. This safety radius is based on the fact that monitoring during Bird Island construction at times detected pile driving sounds in excess of 160 dB as far away from the construction site as 1,350 feet. The marine mammal monitors shall have some quantitative way to estimate distance either by using buoys or offshore structures at a known distance as guidelines or by having distance measurements in their binoculars. If marine mammals are observed to enter this safety zone, any pile driving or drilling activities shall be ceased until all marine mammals have vacated the safety zone.

MM MBIO-3b. Gradual Ramp-up of Pile Driving Unit. The pile driving unit shall be gradually ramped up to full power to ensure any unseen marine mammals could move away if bothered by the noise or vibrations. Gradual ramp-up would avoid startling roosting Brown Pelicans and cormorants by a sudden loud noise.

Rationale for Mitigation

Marine mammals in the immediate area of drilling and/or pile driving operations might be harassed by noises louder than the 160 dB that is considered a conservative threshold for acoustic harassment. Marine mammal observers would ensure that drilling or pile driving operations cease when marine mammals come within 1,500 feet of the construction site. Based on previous sound monitoring of pile driving in the Project area, pile driving sounds at this distance generally would be less than the 160 dB conservatively considered to result in acoustic harassment of marine mammals. Gradual ramp-up of the pile driving equipment would allow undetected marine mammals to leave the area before they were exposed to loud sounds. Gradual ramp-up also would avoid exposing Brown Pelicans and cormorants roosting on Bird Island structures to a sudden loud noise. Implementation of Mitigation Measures NZ-1a through NZ-1c would install sound-control devices on equipment, implement additional BMP's to reduce noise impacts, and maintain buffers. These measures would reduce construction equipment noise to the extent practicable.

Operations

Operational impacts to marine resources from the PRC 421 Project could come from an increased chance of a vessel collision from barge operations to transport the oil and from increased risk of an oil spill.

Impact MBIO-4: Oil Spill Impacts to Marine Resources

Leaks and spills of petroleum hydrocarbons into the ocean could adversely affect marine organisms (Significant, Class I).

Oil production and processing on PRC 421 and the transport of crude oil from the proposed Project by the barge Jovalan from the EMT has the potential to result in the accidental release of petroleum hydrocarbons (Class I). Potential oil spill releases from the proposed Project are discussed in Section 4.2, Safety. A release under most conditions would immediately contact the shore. Oil released to marine waters was assumed to be transported approximately 1 mile west of the site and 2 miles to the east, as shown in Figure 4.2-7. A number of sensitive marine habitats occur within the area most vulnerable to a Project-related oil spill. The Bell Canyon Creek lagoon and the Devereux Slough estuary are estuarine habitats that would be highly likely to suffer impacts in the event of a Project-related oil spill if their mouths were open. Tecolote Creek estuary also is within the area most likely to be affected by an oil spill from the proposed Project.

Significant rocky intertidal habitat that would be vulnerable to a Project oil spill occurs near Coal Oil Point east of PRC 421 and within the bend of "Ellwood Cove" approximately 0.5 miles east of the Project site. Rocky intertidal habitat, primarily boulders and cobble, also occurs west of the Project area up-coast from the Bacara Resort. These rocky intertidal areas are used for research by UCSB.

A sizable kelp bed is located approximately 500 feet offshore of the existing caissons and extends for over 1 mile southeast along the Ellwood Coast. Some eelgrass also occurs offshore the PRC 421 piers.

The new "Bird Island" structures, constructed about 850 offshore Pier 421-1, support large numbers of roosting seabirds including the State and Federal endangered brown pelican and double-crested cormorant, a California Species of Special Concern. These birds would be vulnerable to an oil spill when they are foraging in the water. A Project-related spill could also impact beaches used as foraging and nesting habitat by the Federal threatened western snowy plover and waters used for foraging by the State and Federal endangered California least tern, which also nests at Coal Oil Point. Although not common, the Federal threatened southern sea otter occurs in the Project area. This species is very vulnerable to oil.

Oil spills have been found to have varying effects on marine resources (Aspen 2005). Documented biological damage from an oil spill has ranged from little apparent damage in the Apex Galveston Bay spill (Greene 1991) to widespread and long-term damage, such as the 1969 West Falmouth spill (Sanders 1977). Some factors influencing the extent of damage caused by a spill are the dosage of oil, type of oil, local weather conditions, location of the spill, time of year, methods used for cleanup, and the affected area's previous exposure to oil. Other levels of concern are the possibility of food chain contamination by petroleum products and the impact of an oil spill on the structure of biological communities as a whole.

Oil spilled into the ocean gradually changes in chemical and physical makeup as it is dissipated by evaporation, dissolution and mixing, or dilution in the water column. Various fractions respond differently to these processes, and the weathered residue behaves differently from the material originally spilled. Toxicity usually tends to decrease as oil weathers. Depending on tidal stage and wave energy, oil can become deeply buried in sand and later re-exposed, causing recurrent releases, possibly spanning months or longer.

Laboratory tests have demonstrated the toxicity of petroleum hydrocarbons for many organisms. Soluble aromatic compounds in crude oil are generally toxic to marine organisms at concentrations of 0.1 to 100 ppm. Planktonic larval stages are usually the most sensitive. Very low levels of petroleum, below 0.01 mg/L, can affect such delicate organisms as fish larvae (National Response Center [NRC] 1985). Concentrations as low as 0.4 ppb caused premature hatching and yolk-sac endema in Pacific herring eggs exposed to weathered Alaska crude oil (NRC 2003).

Biological impacts of oil spills include lethal and sublethal effects and indirect effects resulting from habitat alteration and/or destruction or contamination of a population's food supply. Directly lethal effects may be chemical (i.e., poisoning by contact or ingestion) or physical (i.e., coating or smothering with oil). A second level of interaction is sublethal effects, which are those which do not kill an individual but which render it less able to compete with individuals of the same and other species.

Impacts to plankton from oil pollution could range from direct lethal effects caused by high concentrations of oil in the surface layers of the water column after a major spill to a variety of sublethal effects such as decreased phytoplankton photosynthesis and abnormal feeding and behavioral patterns in zooplankton. Studies of oil spills have generally failed to document major damage to plankton, although lethal effects or

severe oiling of individual zooplankton organisms in the immediate vicinity of a spill has been reported in a number of studies. Because plankton distribution and abundance are so variable in time and space, evidence of damage might be very difficult to document, even if it did occur.

Plankton populations on the open coast are expected to have low vulnerability to an oil spill. Even if a large number of individual organisms were oiled, rapid replacement by individuals from adjacent waters is expected. In addition, the regeneration time of phytoplankton cells is rapid (9 to 12 hours) and zooplankton organisms are characterized by wide distributions, large numbers, short generation times, and high fecundity (NRC 1985). The impacts to plankton of a spill from PRC 421 operations are expected to be adverse but less than significant (Class III).

Open coast sandy beaches, like those immediately adjacent to Piers 421-1 and 421-2 generally would not be expected to suffer long-term damage from an oil spill. Once the oil has been removed, recolonization by sandy beach organisms tends to be rapid (Aspen 2005). However, if large amounts of oil coat the beach, substantial loss of intertidal organisms could occur. Sand and gravel beach habitat was adversely affected by the 1997 Torch/Platform Irene spill off the south-central coast of California (Torch/Platform Irene Trustee Council 2006). After the spill, invertebrates on the beach, particularly sand crabs, and Pismo clams, likely suffered significant mortality due to smothering under blankets of oil and sand compression caused by heavy equipment from cleanup operations. Therefore, in the event of a large spill, impacts to sandy beach habitat could be significant (Class I).

Most studies of oil spills have shown that rocky intertidal communities tend to suffer harmful impacts, although spills have occurred where no impacts to this habitat were observed (e.g., Chan 1987). Oil represents a physical and chemical hazard, and intertidal organisms are especially vulnerable to the physical effects of oil (Percy 1982). Sessile species, such as barnacles, may be smothered, while mobile animals, such as amphipods, may be immobilized and glued to the substrate or trapped in surface slicks in tidepools. It has been hypothesized (Hancock 1977) that organisms in the upper intertidal areas where the oil dries rapidly are more apt to be affected by physical effects of oil, such as smothering, whereas organisms in the lower intertidal areas are more exposed to the chemical toxic effect of the liquid petroleum.

The 1997 Torch/Platform Irene spill oiled rocky intertidal habitat in many places along the shoreline. Although levels of injury greater than 10 percent were not documented,

the oil exposure was thought to cause low levels of injury to a variety of rocky intertidal species including crustacea, mollusks, arthropods, and algae (Torch/Platform Irene Trustee Council 2006). Black abalone (*Haliotis cracherodii*) and mussel beds were observed to be coated with oil along or near the shores of Vandenberg Air Force Base and at other nearby rocky shorelines.

If an intertidal area suffers severe damage from an oil spill, it may take years for complete recovery. A study of recovery of rocky intertidal communities of central and northern California (Foster et al. 1991) suggested that the high intertidal, algal-dominated *Endocladia/Mastocarpus* community would take one to six years to recover in places where a large area had been decimated, while the mid-intertidal mussel bed assemblage would be likely to take more than 10 years to recover from a disturbance that affected a large area. Mussel beds have been found to trap oil and under some circumstances may allow the oil to persist for years after a spill (NRC 2003). Documented recovery times of intertidal communities from actual oil spills have varied, but have been generally consistent with the above predictions.

Impacts to valuable intertidal habitat in the immediate Project area is of particular concern because oil spilled from the piers, pipelines or during loading the barge at the EMT could reach these areas rapidly. Rocky intertidal ESHAs occur at “Ellwood Cove” east of the site, Coal Oil Point, Goleta Point and from Point Conception to Ellwood. Impacts to rocky intertidal habitat from a Project related petroleum spill has the potential to be significant (Class I).

Compared to the readily observable impact on intertidal communities, impacts on benthic subtidal communities have been more difficult to document. This lack of documented impacts has been found both in the shallow (6 to 60 feet) and deep (>60 feet) subtidal areas. However, the studies that have shown impacts have generally been of shallow water benthic habitats. Often the lack of effects on subtidal communities appears to be because oil does not sink to the bottom. For example, in shallow subtidal SCUBA diving surveys following the 1988 Nestucca spill in Gray’s Harbor, Washington, no evidence of subtidal oil deposits was found, and no sediment samples contained oil and grease above detection limits (Carney and Kvitek 1990).

Most studies have failed to document negative effects of oil spills on kelp beds. However, Thom et al. (1993) found that the tissues of bull kelp, *Nereocystis luetkeana*, were damaged following direct exposure to several oil types, including intermediate fuel oil, diesel fuel, and Prudhoe Bay crude oil. Furthermore, oil can cling to kelp and cause

the surrounding shoreline to be repeatedly doused by oil as happened in the 1992 Avila spill (Togstad 1993). Kelp holdfasts also can retain oil for years after a spill (NRC 2003). Impacts to Project area kelp beds are unlikely to significantly affect the kelp itself but the oil could persist and affect the associated ecosystem (Class I).

Oil spills can affect seabirds directly through oil contamination and indirectly through degradation of important habitat. The direct effect of oiling on birds is predominantly contamination of feathers, removing insulative qualities and reducing buoyancy (Holmes and Cronshaw 1977; Moskoff 2000). Oiling of feathers leads to elevated metabolic rate and hypothermia (Hartung 1967). Oiled birds may also ingest oil through preening of feathers or feeding on contaminated prey. Effects of ingested oil can range from acute irritation and difficulties in water absorption to general pathologic changes in some organs (e.g., Crocker et al. 1974; Fry 1987; Nero and Associates 1983). Ingestion of oil can also result in changes in yolk structure, and reduction in number of eggs laid and egg hatchability (Hartung 1965; Grau et al. 1977). Oiled birds that are able to return to a nest can contaminate the exterior of eggs, reducing hatchability (e.g., Hartung 1965; Patten and Patten 1977). Indirect effects result principally from contamination of habitat where feeding occurs.

Marine birds are known to be conspicuous casualties of oil spills (Hope-Jones et al. 1970; Ford et al. 1991; Torch/Platform Irene Trustee Council 2006). For example, it has been estimated that between 100,000 and 435,000 birds died within three months of the Exxon Valdez spill (Moskoff 2000). Nearly 11 million gallons of oil, orders of magnitude more oil than could be spilled from the proposed Project, were spilled in the 1989 Exxon Valdez spill, but the effects of the Exxon Valdez spill are mentioned to illustrate the extreme vulnerability of seabirds to spilled oil. Those species suffering greatest mortality from past spills along the outer coast have been alcids, cormorants, loons, grebes, and scoters (Smail et al. 1972; Dobbin et al. 1986; Page and Carter 1986). These groups are more vulnerable because they are found in large numbers on the water. Other birds (e.g., gulls and pelicans) typically spend less time on the water or will relocate from the area affected by a spill (Sowls et al. 1980). In the years since the Exxon Valdez spill several species of birds have demonstrated indirect or delayed responses to the spill (NRC 2003). These responses were found in sea ducks and shorebirds, species that forage primarily on intertidal and shallow subtidal invertebrates, as well as several species that forage on small fish found in inshore waters.

The Torch/Platform Irene spill is estimated to have adversely impacted between 635 and 815 seabirds and shorebirds (Torch/Platform Irene Trustee Council 2006). Seabird

species impacted by the spill included Brandt's cormorants, common murres (*Uria aalgae)*, western grebe, rhinoceros auklet (*Cerorhinca monocerata*), pigeon guillemot (*Cepphus columba*), elegant tern (*Sterna elegans*), common loon (*Gavia immer*), California Brown Pelican and several species of shearwaters and gulls.

California Brown Pelicans and cormorants roosting on the Bird Island structures on PRC 421 are likely to suffer impacts from a Project-related oil spill at the piers or the EMT. These birds would be expected to forage in Project area waters and are likely to be oiled. If a spill occurred during the Least Tern nesting season, California Least Terns from the colony at the Coal Oil Point Reserve might be impacted by the oil. Clearly, a Project-related oil spill has the potential to significantly impact seabirds (Class I).

Direct effects of oiling on pinnipeds and sea otters include both surface contamination of fur and possible ingestion of oil while grooming or during suckling of pups. Harbor seals, elephant seals, and sea lions rely predominantly on subcutaneous fat and a high metabolic rate to keep warm. In contrast, fur seals and sea otters depend on the integrity of an air layer trapped in clean fur to provide insulation and buoyancy. Harbor seal pups may be born with a lanugo coat of dense wooly fur to keep them warm until they have stored sufficient subcutaneous fat. These fur-bearing pinnipeds are at particular risk from an oil spill because oiling can reduce the heat-retaining properties of the fur and result in hypothermia and death.

Sea otters, fur seals, and very young harbor seal pups are at extreme risk of mortality from oil spills. Although the main sea otter population is north of Point Conception and would only be vulnerable to a Project-related spill from the transportation of PRC 421 oil to the San Francisco area, sea otters do occur in the Ellwood area and one or more otters could be oiled from a spill at one of the piers, pipelines or the EMT. There is no evidence that sea otters are able to successfully avoid oiling if a spill reaches near-shore waters, and both adults and younger animals are equally susceptible to death from oiling. Fur seals, while sensitive to oiling, are typically found over the continental slope and waters farther offshore and are rare in Project area waters. Harbor seal pups with a lanugo coat are susceptible to impacts from oil spills in the first week of life. After molt of the natal fur, and when sufficient fat has been acquired, oil contamination is not likely to have adverse effects. If oil spilled in Project area waters reached the harbor seal rookery east of Naples when pups were present, their fur could become oiled. Impacts of an oil spill on sea otters or harbor seal pups would be significant (Class I).

Cetaceans have smooth skin to which oil does not readily adhere. Direct effects of oil spills are limited in large part to inhalation of volatile components and ingestion during feeding by baleen whales. Baleen whales feed opportunistically, but regularly visit specific feeding grounds where euphausiid crustaceans and other invertebrates or small fish form dense shoals. Gray whales, although abundant in winter and spring, feed infrequently and only opportunistically during migration.

The extent to which large whales will avoid oil spills is still unclear. Migrating gray whales have been noted making some attempt to avoid natural oil seeps, but the behavior is inconsistent (Kent et al. 1983). Humpback whales have been observed feeding in an area off Cape Cod where thin oil sheens were present from the Regal Sword spill (Goodale et al. 1979).

Toothed whales, which use echo-location to orient and find prey, may be able to avoid oil slicks. In studies with captive animals, bottlenose dolphins were found to reliably detect oil in a slick one millimeter thick and avoid contact (Geraci et al. 1983; Smith et al. 1983).

Mitigation Measures

MM MBIO-4a. Update South Ellwood Field EAP to Address a Spill from Lease PRC 421 Oil Production. Venoco shall update the South Ellwood Field EAP to specifically identify training and procedures to contain oil spilled from production at Lease PRC 421. The EAP shall identify sensitive resources, including the birds on the Bird Island platforms, kelp beds offshore the piers, intertidal and subtidal resources at Coal Oil Point, the harbor seal rookery at Burmah Beach and Naples Reef that could be oiled rapidly from a spill on PRC 421. Rapid response procedures to protect those sensitive resources shall be identified.

MM MBIO-4b. Develop a Protection Plan to Keep Birds Roosting on Bird Island from Harm in the Event of an Oil Spill on Lease PRC 421. Venoco shall consult with wildlife and bird rehabilitation experts and develop a plan specifically to protect pelicans and cormorants roosting on the Bird Island platforms from harm in the event of an oil spill. If wildlife experts deem it appropriate, this plan may include methods to deter the birds from feeding or resting in oiled waters. The plan also shall include procedures to capture and rehabilitate oiled birds.

Rationale for Mitigation

The South Ellwood Field EAP refers to the beachfront leases of PRC 421 but no procedures specific to those leases are identified. With the resumption of oil production

from PRC 421, the potential exists for oil to be spilled from Pier 421-2 as well as from loading of PRC 421 oil at the EMT and transport on the barge Jovalan. Procedures to protect sensitive marine resources in the immediate vicinity of Pier 421 would help to keep oil from reaching these resources. Pelicans and cormorants roosting on the Bird Island platforms in Lease PRC 421 are in immediate danger from a spill at the lease. The development of specific procedures to deter birds from oiled areas and rehabilitate oiled birds would help to reduce impacts on these species.

Residual Impact

Even with specific procedures to protect sensitive marine resources in the vicinity of PRC 421, impacts of a major oil spill would be significant.

Impact MBIO-5: Collision of a Barge Transporting Oil from PRC 421 with a Marine Mammal or Sea Turtle

The additional barge traffic that would be required to transport oil produced from PRC 421 increases the chances that a marine mammal or sea turtle could be injured by collision with a vessel (Potentially Significant, Class II).

A marine mammal or sea turtle could be killed or injured by collision with the barge transporting oil produced on PRC 421. An average of about three California sea lions and three harbor seals are killed or injured by boat collisions in California each year (Carretta et al. 2004). One or more baleen whales may be injured or killed by vessel collisions in a year. From 1990 to 1998, seven vessel strikes of gray whales were reported off the coasts of Alaska, Washington, Oregon, and California (Rugh et al. 1999). Odontocetes rarely are reported as victims of ship strikes. Most lethal or severe injuries to whales from ship strikes appear to be caused by ships measuring 260 feet or more in length and traveling at speeds of 14 knots or greater (Aspen 2005). However, a juvenile gray whale recently was apparently struck by a slow-moving cable-placement vessel's propellers during cable installation off Morro Bay (Harvey 2004). The encounter severed the whale calf's flukes and it is unlikely that the whale survived.

Oil produced from the proposed Project would be loaded at the EMT onto the barge Jovalan and delivered to Venoco's market facilities in Los Angeles and San Francisco. Implementation of the proposed Project would increase the number of barge calls at the EMT by approximately 20 percent in the first year of operation with decreasing trips in subsequent years. Five additional barge trips are expected to be needed in the first year. Therefore, the additional risk of injury to a marine mammal from a vessel collision

from the proposed Project would be low. However, any Project-related injury to a marine mammal or sea turtle would be a potentially significant impact (Potentially, Significant, Class II).

Mitigation Measures

MM MBIO-5a. Marine Mammal Contingency Plan. Venoco shall ensure that vessel operators develop and implement a contingency plan that focuses on recognition and avoidance procedures when marine mammals are encountered at sea. There does not appear to be an existing marine mammal contingency plan for the barge Jovalan. Venoco shall require operators to provide documentation of compliance with the marine mammal contingency plan. Minimum components of the plan include:

1. Existing and new vessel operators shall be trained by a marine mammal expert to recognize and avoid marine mammals prior to Project-related activities. Training sessions shall focus on the identification of marine mammal species, the specific behavior of species common to the Project area and barge routes, and awareness of seasonal concentrations of marine mammal species. The operators shall be re-trained annually.

2. A minimum of two marine mammal observers shall be placed on all support vessels during the spring and fall gray whale migration periods, and during seasons when marine mammals are known to be in the Project area and along the barge route in relatively large numbers. Observers can include the vessel operator and/or crew members, as well as any Project worker that has received proper training.

3. Vessel operators will make every effort to maintain a distance of 1,000 feet from sighted whales and other threatened or endangered marine mammals or marine turtles.

4. Vessel speed shall be limited to 16 miles per hour because most severe injuries to whales from ship strikes occur from vessels traveling above this speed.

5. Support vessels will not cross directly in front of migrating whales or any other threatened or endangered marine mammal or marine turtle.

6. When paralleling whales, supply vessels will operate at a constant speed that is not faster than the whales.

7. Female whales will not be separated from their calves.

8. Vessel operators will not herd or drive whales.

9. If a whale engages in evasive or defensive action, support vessels will drop back until the animal moves out of the area.

Any collisions with marine wildlife will be reported promptly to Federal and State agencies listed below pursuant to each agency's reporting procedures.

Stranding Coordinator, Southeast Region (currently, Joe Cordaro)
National Marine Fisheries Service
Long Beach, CA 90802-4213
(310) 980-4017

Enforcement Dispatch Desk
California Department of Fish and Game
Long Beach, CA 90802
(562) 590-5132 or (562) 590-5133

California State Lands Commission
Environmental Planning and Management Division
Sacramento, CA 95825-8202
(916) 574-1890

Rationale for Mitigation

Training and implementation of procedures to avoid impacts on marine mammals will reduce the potential that an animal would be injured by Project-related vessel movements.

Impact MBIO-6: Oil Spill Impacts to Commercial and Recreational Fishing

Accidental discharge of petroleum hydrocarbons into marine waters would adversely affect commercial and recreational fishing (Significant, Class I).

Impact Discussion

A wide variety of fish and shellfish species are commercially harvested in the Project area and biota residing in intertidal and shallow subtidal habitats are vulnerable to oil spills. Several species are commercially and recreationally harvested in the intertidal zone. Sea urchins, for example, ranked first in both pounds landed and dollar value over the six-year period from 1999 to 2005. Both sea urchins and lobsters are high-value species that are harvested commercially and recreationally in the immediate Project area. In addition, market squid alone accounted for over half (70 percent) of the dollar value of the commercial catch during the six years, and accounted for 44 percent

of the total catch in biomass. Other intertidal or shallow subtidal organisms such as sea cucumbers and whelks are also harvested within the Santa Barbara Channel. Additionally, The Cultured Abalone relies on kelp harvest from lease 27 located near the Project area.

In the event of an oil spill, impacts could occur to the local commercial and recreational fishing industry. The degree of oiling and the oil spill impacts depend on several factors. These include location of spill, volume, type of oil, amount of weathering, evaporation, dispersion of oil into the water column or shoreline, weather conditions at the time of the spill and immediately following, and the amount of oil that is contained and cleaned immediately after a spill. Although large spills, e.g., greater than 2,000 barrels, are rare, the Santa Barbara oil spill of 1969 was estimated at 80,900 barrels (CSLC 2006). The 1997 spill from the rupture of the Torch Pedernales pipeline was estimated at 163 to 1,242+ barrels (CSLC 2006). While the probability for a spill that would cause oil to contact and foul the shoreline or shallow subtidal areas where commercial or recreational species are harvested is low, the potential for such a spill exists. While contaminated shorelines may be cleaned, in some instances, depending on substrate type, oil may persist in sediments for several years.

Since the Exxon Valdez spill in 1989, several studies have described the effects of oil spills in marine environments, the results of which are incorporated into this analysis by reference (Hayes and Michel 1998, NRC 1985, Coats et al. 1999, Spies et al. 1996, and Brown et al. 1996). Adult fish, due to their mobility, may be able to avoid or minimize exposure to spilled oil. However, there is no conclusive evidence that fish would avoid spilled oil. Egg and larval stages would also not be able to avoid exposure to spilled oil. The resultant potential losses to commercial and recreational fish resources and those losses due to closure of fishing areas for most or all of a fishing season is considered a potentially significant impact. In addition, fish harvested from contaminated areas may also be reduced in value, and fishing gear may be damaged due to oil fouling, causing additional significant impacts.

Mitigation Measures

Implementation of MMs identified in Sections 4.2, Safety; 4.5, Hydrology, Water Resources, and Water Quality; and 4.7, Terrestrial Biological Resources, for contingency planning and spill response would be required.

Rationale for Mitigation

The measures presented in the above-mentioned sections provide improved oil spill response capabilities, oil spill containment measures, and protection of resources. With implementation of those measures, the risk to the marine environment and impacts to commercial and recreational fishing may be reduced.

Residual Impacts

Because there are limitations to thorough containment and cleanup of an offshore oil spill, significant impacts remain for commercial and recreational fisheries in the intertidal and shallow subtidal zones.

Impact MBIO-7: Impacts to Kelp Harvesting

Oil spills could cause damage to kelp beds, which would subsequently affect kelp harvesting. Damage would likely be minor, and kelp would likely recover rapidly (Less than Significant, Class III).

Impact Discussion

The effects of oil spills from the proposed Project or from transportation using barge Jovalan on beds of giant kelp along the Pacific Coast have been examined several times. Oil spills have caused little damage to the giant kelp beds, even with considerable quantities of crude oil fouling the surface canopies (CSLC 2006). It appears crude oil stays on the surface of the water and does not tend to adhere to the fronds of the giant kelp. The literature indicates that an oil spill and its cleanup cause little damage to kelp beds. Should damage occur, recruitment and recolonization occurs rapidly. Therefore, although impacts could occur to kelp canopies, which could affect commercial kelp harvesting, they are generally localized and temporary in nature. Hence, impacts to kelp and commercial and recreational kelp harvesting operations are adverse but not significant (Class III).

Mitigation Measures

None required.

Impact MBIO-8: Impacts to Fishermen's Gear

An increase in marine traffic caused by the proposed Project could cause fishing gear to be damaged or lost (Less than Significant, Class III).

Impact Discussion

An increase in annual trips made by barge Jovalan and supporting marine vessels would result from implementation of the proposed Project. Support vessels servicing the PRC 421 would use Santa Barbara harbor as the shore-based facility. The support vessel traffic would cross near-shore fishing areas, and may cause damage to fishing gear. If support vessels hit fishing gear, the gear can be damaged or lost.

In 1983, the Joint Oil/Fisheries Liaison Office, a private nonprofit service, was formed along with the Joint Oil/Fisheries Committee of South Central California to provide an inter-industry communications link and dispute-resolution/mediation process between the offshore oil and gas industry and the commercial fishing industry in the Santa Barbara Channel and Santa Maria Basin.

To reduce the conflict between support vessel traffic and the commercial fishing industry, a Vessel Traffic Corridor Program was developed by the Joint Oil/Fisheries Committee of South Central California and went into effect in August, 1984. These (voluntary) vessel traffic corridors are approximately 1,500 feet wide. In the Santa Barbara Channel, most barges travel in the internationally designated TSS. On voyages up the coast, tank vessels are generally between 12 to 15 nm offshore.

Given that support vessels servicing the EMT generally use the vessel traffic corridors and the fact that there is a Joint Oil/Fisheries Liaison Office that provides dispute resolution/mediation, this impact is considered adverse but less than significant (Class III).

Mitigation Measures

None required.

Impacts Related to Future Transportation Options

For the purposes of this analysis, it is assumed that Line 96 and the EMT would be used to transport crude oil recovered from PRC 421 using the barge Jovalan to ship the oil to a Los Angeles or San Francisco Bay area refinery through approximately the year 2013. However, as discussed earlier in this EIR (Sections 1.2.4, 2.4.2, and 3.3.6), several options exist for future transportation of oil from the Project, each with different potential impacts to marine biological resources. These include ongoing use of the EMT through 2013, use of a pipeline to Las Flores Canyon, and trucking of oil to Venoco's ROSF Facility 35 miles to the south and subsequent transport to Los Angeles via pipeline. The potential marine biological resources impacts from transportation

using the existing EMT system are fully described above (see Impacts MBIO-4 through MBIO-8).

The timing and exact mode of transportation of produced oil after the initial five years of Project operation are speculative at this point in time. If neither option is permitted or available by the cessation of operation of the EMT, production from PRC 421 would be stranded, at least temporarily, until an alternative transportation mode is approved and becomes available.

Neither transportation option is expected to result in potentially significant impacts to marine biological resources, as discussed in the alternatives analysis (Section 4.6.5). The likelihood of an accident or event and subsequent spill during transportation is low (see Section 4.2, Safety). Additionally, in the event that such a spill did occur, marine resources are unlikely to be impacted due to the distance from transportation routes to the ocean.

Table 4.6-3. Summary of Marine Biological Resources Impacts and Mitigation Measures

Impact	Mitigation Measures
MBIO-1: Disturbance to Intertidal Organisms during Caisson Repairs	**MBIO-1a.** Avoid Caisson Repair During the Grunion Spawning Season (March through September). **MBIO-1b.** Biological Monitoring during Caisson Repair.
MBIO-2: Impacts to Marine Organisms from Sediment Resuspension in the Near-Shore Zone due to Disturbance of Sediments during Caisson Repairs	**HAZ-1c.** Sediment Sampling. **HAZ-1d.** Removal Action Plan. **WQ-1a.** Silt Curtain. **WQ-1b.** Water Quality Certification.
MBIO-3: Noise Impacts to Marine Life during Caisson Repairs	**MBIO-3a.** Marine Mammal Monitors. **MBIO-3b.** Gradual Ramp-up of Pile Driving Unit. **NZ-1a.** Sound-Control Devices. **NZ-1b.** Additional BMPs. **NZ-1c.** Buffers.
MBIO-4: Oil Spill Impacts to Marine Resources	**MBIO-4a.** Update the South Ellwood Field EAP to Address a Spill from Lease PRC 421 Oil Production. **MBIO-4b.** Develop a Protection Plan to Keep Birds Roosting on Bird Island from Harm in the Event of an Oil Spill on Lease PRC 421.
MBIO-5: Collision of a Barge Transporting Oil from PRC 421 with a Marine Mammal or Sea Turtle	**MBIO-5a.** Marine Mammal Contingency Plan.
MBIO-6: Oil Spill Impacts to Commercial and Recreational Fishing	Implementation of MMs identified in Sections 4.2, Safety; 4.5, Hydrology, Water Resources, and Water Quality; and 4.7, Terrestrial Biological Resources for contingency planning and spill response.
MBIO-7: Impacts to Kelp Harvesting	None required.
MBIO-8: Impacts to Fishermen's Gear	None required.

4.6.5 Impacts of Alternatives

No Project Alternative

Under the No Project Alternative the existing wells at Pier 421 would remain shut-in and equipped with subsurface safety valves. This alternative would avoid the impacts of Project start-up and operation. Specifics on decommissioning would be addressed in an Abandonment and Restoration Plan, and related impacts to air quality would be evaluated in applicable environmental documentation such as an MND or an EIR.

However, until PRC 421 is fully decommissioned, potentially significant impacts could occur through damage to or collapse of the caissons and seawall and subsequent releases of oil or contaminated materials into the marine environment. Such impacts would remain similar to that described in MBIO-2 and MBIO-4 (see also Sections 4.2, Safety and 4.3, Hazardous Materials). Application of MM S-11, immediate abandonment, would reduce these impacts to less than significant.

In addition, as noted in Section 2.1.1, the CSLC has concerns about the potential for pressure to build up in the reservoir, causing oil to escape from wells that were abandoned in the 1940s and 1950s. This concern is based on observations following the 1994 shut-in of the PRC 421 wells. The potential for unquantified and uncontrolled releases from previously abandoned wells is of concern, particularly because the releases would directly impact marine waters and coastal habitats. Based upon the thresholds identified in this EIR, any such release of oil into the environment could create potentially significant impacts to affected marine biological resources similar to those identified in Impacts MBIO-4, MBIO-6, and MBIO-7. However, insufficient data exist to quantify the actual potential for such leaks to occur, their exact location or the size of such leaks; therefore it would be speculative to identify either the frequency or potential severity of such impacts at this time.

No Project Alternative with Pressure Testing

This Alternative would address potential impacts from accidental releases from abandoned wells and also eliminate the impacts to marine organisms associated with disturbance, turbidity and noise resulting from repair of the caisson on Pier-421-2. The No Project Alternative also would eliminate the increased risk of a vessel collision with a marine mammal or sea turtle from the transportation of oil produced on PRC 421. Although the risk of a Project-related oil spill would not be eliminated, it would be reduced compared to the proposed Project. The impacts of an oil spill would still have the potential to be significant. MMs MBIO-4a and MBIO-4b would apply. However, as

discussed for the No Project Alternative above, potential impacts from possible caisson collapse and/ or damage to the seawall would remain significant until either full abandonment or completion of repairs and improvements to the caissons and seawalls similar to those required for the project.

Onshore Oil Separation at the EOF

Under this Alternative, oil produced from PRC 421 would undergo separation of oil from water and gas at the EOF instead of Pier 421-2. Caisson repair still would occur at Pier 421-2; therefore, impacts to marine organisms from disturbance, turbidity and noise during caisson repair would occur and would be the same as for the proposed Project. The excavation and jetting of sand during the repair process has the potential to injure grunion eggs. MMs MBIO-1a and MBIO-1b would apply. The impact to marine mammals of noise from drills and/or pile drivers used in caisson construction would be potentially significant. Implementation of MMs MBIO-3a, MBIO-3b, and NZ-1a through 1c would be necessary.

Because oil would be processed onshore at the EOF, the potential for a Project-related oil spill would be reduced compared to the proposed Project. However, an oil spill could still occur via a pipeline rupture or leak, during transfer of oil to the barge at the EMT, or from the barge itself. The impacts of an oil spill on marine resources have the potential to be significant. MMs MBIO-4a and MBIO-4b would apply. In addition, the increase in the number of barge trips to transport oil produced on PRC 421 would increase the risk that a marine mammal or sea turtle could be killed or injured by a collision with the barge. The increase in number of barge trips would be the same as for the proposed Project. MM MBIO-5a would apply.

Under this Alternative, Pier 421-1 would not be required for water re-injection and the decommissioning of Pier 421-1 would be accelerated. The accelerated decommissioning would require submittal of a decommissioning plan for Pier 421-1 to the CSLC and the city of Goleta within approximately 6 months of approval of this alternative. The decommissioning plan would be subject to further environmental review.

Recommissioning Using Historic Production Methods

The impacts of this Alternative would be similar to the proposed Project. Caisson repair would occur at Pier 421-2. Therefore, impacts to marine organisms from disturbance, turbidity and noise during caisson repair would be the same as for the proposed Project.

The excavation and jetting of sand during the repair process has the potential to injure grunion eggs. MMs MBIO-1a and MBIO-1b would apply. The impact to marine mammals of noise from drills and/or pile drivers used in caisson construction would be potentially significant, and MM MBIO-3a, MBIO-3b, and NZ-1a through 1c would apply.

The risk of an oil spill from this Alternative would be higher than for the proposed Project because it would use a less sophisticated historic free water knock out system. The impacts of an oil spill on marine resources have the potential to be significant. Mitigation measures MBIO-4a and MBIO-4b would apply. In addition, the increase in the number of barge trips to transport oil produced on PRC 421 would increase the risk that a marine mammal or sea turtle could be killed or injured by a collision with the barge. The increase in number of barge trips would be the same as for the proposed Project; implementation of MM MBIO-5a would still apply.

Re-injection at Platform Holly

This Alternative would be similar to the proposed Project except that a 2-inch water and gas flowline will be inserted into the existing 6-inch line, which would allow for tie in to the Platform Holly utility line. Produced water and gas would be transported via this utility line to Platform Holly would be re-injected offshore. Repair work would still occur at Pier 421-2 and oil would still be transported via pipeline to the EMT and then transported by barge Jovalan. Therefore, impacts to marine biology would still occur as described under the proposed Project, and all Project MMs related to marine biological resources would apply.

Under this alternative, Pier 421-1 would not be required for water re-injection and the decommissioning of Pier 421-1 would be accelerated. The accelerated decommissioning would require submittal of a decommissioning plan for Pier 421-1 to the CSLC and the city of Goleta within approximately 6 months of approval of this alternative. The decommissioning plan would be subject to further environmental review.

Transportation Sub-Alternative Options

Pipeline Sub-Alternative

This alternative means of oil transportation would involve the construction and operation of an onshore 8.5-mile pipeline from the EOF to the AAPL at Las Flores Canyon. Although pipelines are generally the safest method available for the transporation of crude oil, spills could potentially occur through accidental damage to the pipeline

caused by natural (e.g., seismic activity, flooding) or man made casues (e.g., construction activity, valve failure). However, because the pipeline would be new, include the most recent safety technologies, and would only be in service for approximately 12 years serving PRC 421-1 production, the very remote potential for spills to occur from this pipeline would be considered less than significant (see Section 4.2, Safety). Additionally, in order for an impact to marine biological resources to occur, a release of oil from the pipeline would have to enter a creek or drainage and reach the ocean. The likelihood of such an event is highly improbable. Therefore, impacts to marine biological resources are considered less than significant.

Trucking Sub-Alternative

Under this sub-alternative option, oil produced at PRC 421 would be transported to the ROSF, located just east of Carpinteria. Project-related crude oil would then be transported via several existing common carrier pipelines that go to Los Angeles area refineries. The total one-way distance traveled by each truck would be approximately 35 miles. At the proposed PRC 421 production rate, a maximum of five truck trips per day would be expected during the first year of production. As production decreases, so would subsequent truck trips. Two truck trips per day would be required by year 6 of the proposed Project; and one truck trip per day would be required by year 10.

Impacts on marine biological resources from trucking would occur in the event of an accident that resulted in a spill that reached the ocean. There are several major drainages and numerous minor drainages or roadside ditches along Highway 101 between the EOF and the ROSF. The chances of a spill occurring during transport between these facilities are extremely low and are discussed in Section 4.2.5, Safety, Impacts of Alternatives. The chances of a spill occurring and entering a drainage would be even less. Therefore impacts to biological resources from trucking would be less than significant.

4.6.6 Cumulative Projects Impact Analysis

The proposed oil development on PRC 421 would add to the cumulative risk of impacts to marine resources from an oil spill and the cumulative risk of a vessel collision with a marine mammal or seabird.

Impact MBIO-9: Cumulative Impacts of an Oil Spill on Marine Resources

Oil development at PRC 421 would add to the cumulative risk that marine resources would be impacted by one or more oil spills (Significant, Class I).

Several of the projects in the cumulative project scenario, if implemented, would increase the risk of oil spills beyond baseline conditions; in particular, those that would involve oil development and an increase in large vessels that would carry large amounts of fuel that could be released if an accident occurred.

Oil development projects that would add to the risk of an oil spill in the SCB include the Carpinteria Field Redevelopment Project, Venoco's proposed drilling of new wells from Platform Holly with peak oil production of 12,600 BOPD after five years, and a return to production at Platform Grace. Projects involving increases of large vessels with the potential for a major fuel spill include the Cabrillo Port LNG Terminal, the proposed LNG Terminal at Platform Grace, extension of the EMT lease, and the Port of Los Angeles Marine Terminal Project. The maintenance of the cooperative oil response company, Clean Seas, helps to address cumulative oil spill impacts by maintaining oil spill containment and clean-up equipment, vessels and trained personnel in the SCB. The Project-specific contribution of the proposed Project on PRC 421 to cumulative oil spill impacts would be addressed by its EAP for the South Ellwood Field and the SPCC Plan for PRC 421. Project specific MMs MBIO-4a and MBIO-4b would apply to the proposed Project's share of the cumulative oil spill risk; however, potential cumulative impacts would remain significant (Class I).

Several of the cumulative projects would involve an increase in vessel traffic over baseline conditions and would, therefore, increase the cumulative risk that a marine mammal or sea turtle could be injured by collision with a vessel. Projects that would increase vessel traffic in the SCB include the Cabrillo Port LNG Terminal, the LNG Terminal at Platform Grace, the EMT Lease Extension, the return to production of Platform Grace, the Port of Long Beach onshore LNG Terminal, and the Pacific Energy Systems Marine Terminal Project in the Port of Los Angeles. The proposed Ellwood Full Field Development project would decrease vessel traffic because it would involve the decommissioning of the EMT.

The proposed Project is a relatively minor contributor to the cumulative risk of a vessel collision with marine mammals because it would add approximately five barge trips per year to the baseline vessel traffic. The proposed Project's potential to hit a marine mammal or sea turtle would be reduced to less than significant with implementation of MM MBIO-5a.

Mitigation Measures

Implementation of MMs MBIO-4a and MBIO-4b would be required.

Rationale of Mitigation

Implementation of Project specific mitigation measures would help to reduce the impacts of a Project-related oil spill.

Residual Impact

Even with specific procedures to reduce the risk of a Project-related oil spill, the cumulative impacts of an oil spill would remain significant (Class I).